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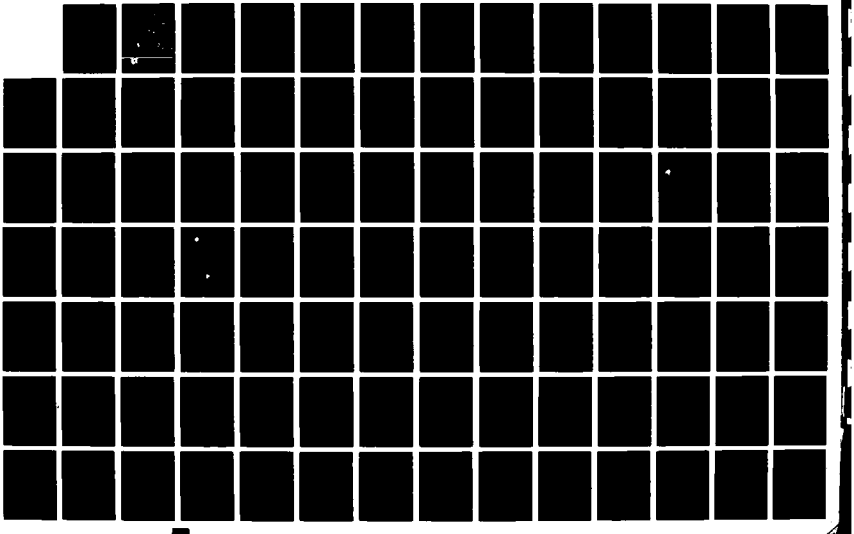

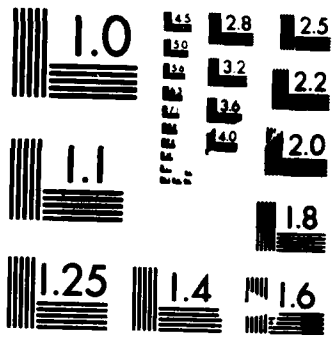

AD-A183 005

EXOATMOSPHERIC REENTRY VEHICLE INTERCEPTION SYSTEM (ERIS)

DEMONSTRATION/VALIDATION PROGRAM ENVIRONMENTAL ASSESSMENT AUGUST 1987

STRATEGIC DEFENSE INITIATIVE ORGANIZATION
SYSTEMS ENGINEERING
WASHINGTON D.C. 20301-7100

Cover Sheet

Responsible Agency: Strategic Defense Initiative Organization

Proposed Action: Conduct Demonstration/Validation tests of the Exoatmospheric Reentry Vehicle Interception System (ERIS) technology.

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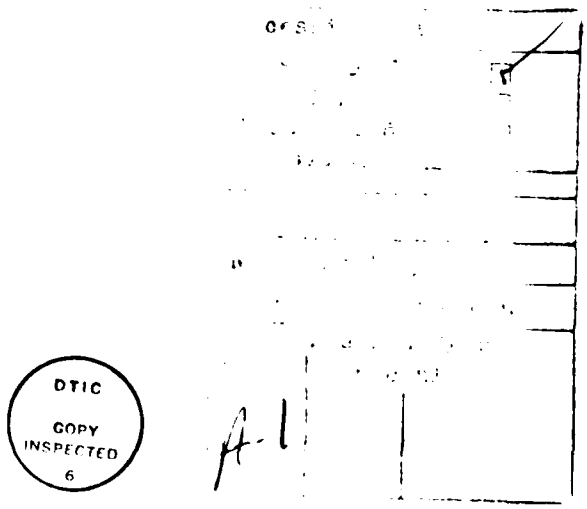
Designation: Environmental Assessment

Abstract: The Strategic Defense Initiative Organization (SDIO) and its proponents (the U.S. Army and the U.S. Air Force) plan to conduct Demonstration/Validation tests of the ERIS technology. These tests will demonstrate the ability of the technology to perform the required tasks, and validate a future decision whether to proceed with Full-Scale Development. Demonstration/ Validation tests would be conducted at the Arnold Engineering Development Center, National Test Facility, Nevada Test Site, Harry Diamond Laboratories, Vandenberg Air Force Base/Western Test Range, U.S. Army Kwajalein Atoll, U.S. Naval Pacific Missile Range at Barking Sands, and contractor facilities. Tests would include analyses, simulations, component/ assembly tests, and flight tests. This document addresses the potential environmental consequences of the Demonstration/ Validation testing of the ERIS technology.

Available to the Public: August 1987



EXECUTIVE SUMMARY

INTRODUCTION

The National Environmental Policy Act, the Council on Environmental Quality regulations implementing the Act (40 CFR 1500-1508), and the Department of Defense (DoD) Directive 6050.1 which supplements these regulations, direct that DoD officials take into account environmental consequences when authorizing or approving major Federal actions in the United States. Accordingly, this Environmental Assessment analyzes the potential environmental consequences of a proposed transition from Concept Exploration to Demonstration/Validation of the Exoatmospheric Reentry Vehicle Interception System (ERIS), one of the technologies being considered in the Strategic Defense Initiative program. The tests and evaluations associated with Demonstration/Validation will be in accordance with the Antiballistic Missile Treaty and are currently structured to conform to the restrictive interpretation of the Treaty. The decision to proceed to Demonstration/Validation for ERIS would not preclude other technologies, nor would it mandate the eventual Full-Scale Development or Production/Deployment of ERIS.

BACKGROUND

The President's announcement of a Strategic Defense Initiative on March 23, 1983, initiated an extensive research program to determine the feasibility of developing an effective ballistic missile defense system to protect the United States and its allies from enemy missile attack. The Strategic Defense Initiative Organization was established to plan, organize, coordinate, direct, and enhance the research and testing of technologies applicable to strategic defense. Future implementation of a Strategic Defense System would be based on the Strategic Defense Initiative research program.

Many technologies currently are being investigated. Among the technologies being considered for Demonstration/Validation are space-based technologies:

- o Boost Surveillance and Tracking System (BSTS)
- o Space-based Surveillance and Tracking System (SSTS)
- o Space-Based Interceptor (SBI)

and ground-based technologies:

- o Exoatmospheric Reentry Vehicle Interception System (ERIS)
- o Ground-based Surveillance and Tracking System (GSTS)
- o Battle Management/Command and Control, and Communications (BM/C^3).

DoD Directive 5000.1 calls for a staged approach to the DoD acquisition process. In keeping with that mandate, DoD's major system acquisition process consists of four distinct stages: Concept Exploration, Demonstration/Validation, Full-Scale Development, and Production/Deployment. These four stages are separated by three major decision points (Milestones I, II, and III). Prior to Milestone I, the Defense Acquisition Board will review the

results of Concept Exploration and decide whether the subject technology will be carried forward into Demonstration/Validation or remain in the Concept Exploration stage. The ERIS Strategic Defense Initiative technology is approaching the end of Concept Exploration and is preparing for Demonstration/ Validation.

PURPOSE AND NEED

The purpose of the Demonstration/Validation program for ERIS is to determine the ability of the technology to perform its intended function, and to provide the information necessary to make an informed decision whether to proceed with Full-Scale Development. These activities are the first steps needed to support a decision to develop, produce, and deploy the ERIS technology, which is integral to an effective strategic defense.

The function of ERIS would be to intercept and destroy hostile intercontinental or submarine-launched ballistic missiles in the midcourse phase of their flight. The ERIS would provide a necessary element of one alternative architecture of the proposed Strategic Defense System.

PROPOSED ACTION

The proposed action is the Demonstration/Validation program for the ERIS technology. This program would demonstrate whether the system can meet its specific performance requirements and would provide the information necessary for the Defense Acquisition Board to recommend a Milestone II decision to proceed into Full-Scale Development.

Demonstration/Validation of ERIS would require fabrication and ground testing of a limited capability homing kinetic-energy weapon composed of a sensor, general processor, signal processor, guidance and control subsystem, and communications subsystem. The homing kinetic-energy weapon would then be flight tested in a series of four to seven launches. The fabrication and ground testing of the components of the weapon would take place in contractor and government facilities. Flight testing would require modification of existing launch facilities at one or two DoD installations.

Demonstration/Validation of ERIS will address the following technological issues:

- o General Processor Hardware: Test the durability, fault tolerance, and reliability of the microprocessors.
- o Sensor Error: Verify that the error is small enough that the weapon is capable of intercepting the target.
- o Communications Subsystem: Verify the ability to accept instructions to divert or abort.

The Demonstration/Validation testing activities for the ERIS program fall into four categories: analyses, simulations, component/assembly tests, and flight tests. The tests and their proposed locations are provided in Table S-1.

TABLE S-1.
DEMONSTRATION/VALIDATION TESTING FOR THE EXOATMOSPHERIC REENTRY VEHICLE INTERCEPTION SYSTEM

TEST ACTIVITIES	TEST TECHNIQUES: Analyses	Simulations	Component/ Assembly	Flight	LOCATIONS[1]
Missile (booster) ability to respond to Inflight Guidance Update Data		X			ERIS Integrated Test Facility, Lockheed Missiles and Space Company[2]
				X	U.S. Army Kwajalein Atoll[3,4]
				X	Vandenberg Air Force Base/Western Test Range
				X	Pacific Missile Range Facility[4]
Determine allowable error in target location data for successful interception		X			ERIS Integrated Test Facility, Lockheed Missiles and Space Company[2]
				X	U.S. Army Kwajalein Atoll[3,4]
				X	Vandenberg Air Force Base/Western Test Range
				X	Pacific Missile Range Facility[4]

[1] Adequate facilities exist unless otherwise noted.

[2] Lockheed Missiles and Space Company has certified compliance with all Federal, State, and local environmental laws and regulations.

[3] Use of the U.S. Army Kwajalein Atoll for flight testing also requires launching dedicated targets from Vandenberg Air Force Base using the Western Test Range, and possibly from the Pacific Missile Range Facility at Barking Sands.

[4] Facility construction or modification required (excluding minor modification).

TABLE S-1 (Continued).
DEMONSTRATION/VALIDATION TESTING FOR THE
EXOATMOSPHERIC REENTRY VEHICLE INTERCEPTION SYSTEM

TEST ACTIVITIES	TEST TECHNIQUES: Analyses	Simulations	Component/ Assembly	Flight	LOCATIONS[1]
Homing kinetic-energy weapon ability to seek out target		X			ERIS Integrated Test Facility, Lockheed Missiles and Space Company[2]
				X	U.S. Army Kwajalein Atoll[3,4]
				X	Vandenberg Air Force Base/Western Test Range
				X	Pacific Missile Range Facility
Homing kinetic-energy weapon ability to find target based on Threat Object Map	X	X			ERIS Integrated Test Facility, Lockheed Missiles and Space Company[2]
				X	U.S. Army Kwajalein Atoll[3,4]
				X	Vandenberg Air Force Base/Western Test Range
				X	Pacific Missile Range Facility[4]

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TABLE S-1 (Continued).
DEMONSTRATION/VALIDATION TESTING FOR THE EXOATMOSPHERIC REENTRY VEHICLE INTERCEPTION SYSTEM

TEST ACTIVITIES	TEST TECHNIQUES: Analyses	Simulations	Component/ Assembly	Flight	LOCATIONS[1]
Hardware components of the homing kinetic-energy weapon ability to function individually			Dynamic Chamber		ERIS Integrated Test Facility, Lockheed Missiles and Space Company[2]
Guidance and control system ability to respond to signals and to Threat Object Map		X			ERIS Integrated Test Facility, Lockheed Missiles and Space Company[2]
			Wind Tunnel		Arnold Engineering Development Center
				X	U.S. Army Kwajalein Atoll[3,4]
				X	Vandenberg Air Force Base/Western Test Range
				X	Pacific Missile Range Facility[4]

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TABLE S-1 (Continued).
DEMONSTRATION/VALIDATION TESTING FOR THE
EXOATMOSPHERIC REENTRY VEHICLE INTERCEPTION SYSTEM

TEST ACTIVITIES	TEST TECHNIQUES				LOCATIONS[1]
	Analyses	Simulations	Component/ Assembly	Flight	
Guidance and control system ability to maneuver		X			ERIS Integrated Test Facility, Lockheed Missiles and Space Company[2]
				X	U.S. Army Kwajalein Atoll[3,4]
				X	Vandenberg Air Force Base/Western Test Range
				X	Pacific Missile Range Facility[4]
Integration of all components of the homing kinetic-energy weapon			Dynamic Chamber		ERIS Integrated Test Facility, Lockheed Missiles and Space Company[2]
				X	U.S. Army Kwajalein Atoll[3,4]
				X	Vandenberg Air Force Base/Western Test Range
				X	Pacific Missile Range Facility[4]

[1] Adequate facilities exist unless otherwise noted.

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[4] Facility construction or modification required (excluding minor modification).

TABLE S-1 (Continued).
DEMONSTRATION/VALIDATION TESTING FOR THE EXOATMOSPHERIC REENTRY VEHICLE INTERCEPTION SYSTEM

TEST ACTIVITIES	TEST TECHNIQUES				LOCATIONS[1]
	Analyses	Simulations	Component/ Assembly	Flight	
Determine ability of circuitry to withstand nuclear environment			Broad Spectrum Radiation		Nevada Test Site
			Radiation Chamber/ Electromagnetic Pulse Test Facility		Harry Diamond Laboratories
Analysis and storage of data from flight tests	X	X			National Test Facility[4]

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[3] Use of the U.S. Army Kwajalein Atoll for flight testing also requires launching dedicated targets from Vandenberg Air Force Base using the Western Test Range, and possibly targets from the Pacific Missile Range Facility at Barking Sands.

[4] Facility construction or modification required (excluding minor modification).

NO-ACTION ALTERNATIVE

The no-action alternative is to continue with Concept Exploration activities without progressing to the Demonstration/Validation stage at this time.

ENVIRONMENTAL SETTING

The test activities of the ERIS Demonstration/Validation program would be carried out at one contractor facility (Lockheed Missiles and Space Company), and at eight government facilities: Arnold Engineering and Development Center, National Test Facility, Nevada Test Site, Harry Diamond Laboratories, Vandenberg Air Force Base/Western Test Range, U.S. Army Kwajalein Atoll, and U.S. Naval Pacific Missile Range Facility at Barking Sands. The attributes of each of these facilities as they relate to the proposed testing activities follow.

The contractor facility, **Lockheed Missiles and Space Company** in Sunnyvale, California, has a dedicated existing facility, the ERIS Integrated Test Facility, for the ERIS program. This facility was originally built for testing of the Homing Overlay Experiment and is capable of completing all proposed analyses, simulations, and component/assembly tests for the ERIS. The Lockheed Missiles and Space Company obtained all Federal, State, and local permits and authorizations necessary for facility operations when the ERIS Integrated Test Facility was built and became operational.

Arnold Engineering Development Center, located at Arnold Air Force Station, 7 miles southeast of Manchester, Tennessee, is the nation's largest complex of wind tunnels, jet and rocket engine test cells, space simulation chambers and hyperballistic ranges. Wind tunnel tests are conducted regularly at Arnold Engineering Development Center. Almost all of the 3,700 contractor staff are dedicated to wind tunnel maintenance and operations.

The National Test Facility will be constructed at Falcon Air Force Station in Colorado. An interim facility will be operated out of the Consolidated Space Operations Center, also located at Falcon Air Force Station, until construction is complete.

The Nevada Test Site is located approximately 65 miles northwest of Las Vegas, Nevada. The main function of the site is underground testing of nuclear devices.

Harry Diamond Laboratories have central facilities in Adelphi, Maryland, and another testing facility in Woodbridge, Virginia. The Aurora Facility at Adelphi can test the survivability of electronic circuitry exposed to radiation in a radiation chamber. The Woodbridge Research Facility can test the survivability of materials subjected to electromagnetic pulse. These types of tests are done regularly at Harry Diamond Laboratories; the radiation chamber is used on a constant basis with a small dedicated staff and the electromagnetic pulse test facility is also used on a regular basis.

Vandenberg Air Force Base/Western Test Range, located on the coast of California, is the site the United States uses to test launch operational

land-based intercontinental ballistic missiles. Vandenberg Air Force Base launches between 14 and 20 Minuteman missiles per year. Preparation for launching takes 4 to 8 weeks, although the actual launch takes place during a 4-hour "launch window." Between 200 and 300 people are involved during the launch, including the launch agency and Western Test Range personnel.

The Western Test Range includes a broad area of the Pacific Ocean which functions as a test area for space and missile operations. The range is activated by launches 60 to 70 times each year. Only that portion of the range affected by a launch is actually activated; activation consists of instructing ships and airplanes to stay out of the affected area and either sheltering or evacuating any people living in the activated area.

The U.S. Army Kwajalein Atoll facilities are located on Kwajalein Atoll within the Ralik Chain in the Marshall Islands, east-southeast of Guam. The primary mission of the U.S. Army Kwajalein Atoll is to conduct missile flight testing in support of U.S. Army research and development efforts. The U.S. Army Kwajalein Atoll has facilities on 11 of the approximately 100 islands in the Atoll. Meck Island within the Atoll has existing launch structures from previous launch programs (silo, missile assembly building, and infrastructure).

The U.S. Naval Pacific Missile Range Facility at Barking Sands is located on the island of Kauai, Hawaii. The Pacific Missile Range Facility is used to launch test flights of tactical missiles and other projectiles in support of U.S. Navy test programs. The existing facilities are being upgraded to add the capability of launching intermediate-range booster missiles.

ENVIRONMENTAL CONSEQUENCES

Many of the tests for the ERIS Demonstration/Validation program would be conducted at the contractor facility of Lockheed Missiles and Space Company. The contractor has been selected through the DoD procurement process. The contractor is required to meet all Federal, State, and local environmental laws and regulations necessary for facility operations.

To assess the potential for and the magnitude of impacts from Demonstration/Validation at each government facility, a two-step methodology was utilized. The first step was the application of assessment criteria to identify activities with no potential for significant environmental consequences. Activities were deemed to present no potential for significant environmental consequences if they met all of the following criteria (i.e., all "yes" answers):

1. Are the facility and its infrastructure adequate for the proposed activity (i.e., can the tests be conducted without new construction, excluding minor modifications)?

2. Is current staffing at the facility adequate to conduct the test, excluding minor staff level adjustments?

3. Does the facility comply with existing environmental standards?

4. Are the resources of the surrounding community adequate to accommodate the proposed testing?

If a proposed test was determined to present a potential for impact (i.e., a "no" answer to any of the above questions), the second step was to evaluate the activity in the context of the following environmental considerations: air quality, water quality, biological resources, infrastructure, hazardous waste, land use, visual resources, cultural resources, noise, and socioeconomics. As a result of that evaluation, consequences were assigned to one of three categories: insignificant, mitigable, or potentially significant.

Environmental consequences were determined to be **insignificant** if, in the judgment of the analysts or as concluded in existing environmental documentation, no potential for significant environmental impacts exists. Consequences were deemed **mitigable** if concerns exist but it was determined that all potential consequences could be readily mitigated through standard procedures, or by measures recommended in existing environmental documentation. If serious consequences exist that could not be readily mitigated, the activity was determined to represent **potentially significant** environmental impacts.

Demonstration/Validation testing for ERIS at **Arnold Engineering Development Center** would use various wind tunnels. Based on the presence of adequate facilities and staff, and compliance with environmental standards, the environmental consequences of testing for ERIS are considered **insignificant**.

The environmental consequences of constructing and operating the **National Test Facility** at Falcon Air Force Station are deemed to be **mitigable**. The consequences have been analyzed in "National Test Facility Environmental Assessment," which also identifies the necessary mitigation measures. The National Test Facility would employ 2,300 workers in a new facility. Until the facility is constructed, workers would be located in existing facilities at Falcon Air Force Station. Air quality, infrastructure, and land use impacts from construction and operation will be mitigable through the use of standard control and conservation practices. No significant impacts are expected on water quality, biological resources, hazardous waste, visual and cultural resources, noise, or socioeconomics.

The environmental consequences of ERIS testing at the **Nevada Test Site** would be **insignificant**. The test would include exposure of circuitry to broad-spectrum radiation during an underground nuclear test scheduled for other programs. No facility/infrastructure modification or additional staff would be required as a consequence of ERIS testing and the facility is in compliance with environmental standards.

Environmental impacts at **Harry Diamond Laboratories**, beyond those that result from normal operations, would not be expected from ERIS testing. The Aurora Facility would conduct radiation testing within its regular schedule with a minor staff level adjustment. The environmental consequences of the testing at the Aurora Facility would be **insignificant**. The Woodbridge Research Facility would test hardening of circuitry subjected to electromagnetic pulse. The electromagnetic pulse test facility is used on a regular basis and would require no additional staff. However, the electromagnetic pulse test facility at the Woodbridge Research Facility is the subject of a civil action for insufficient National Environmental Policy Act documentation. Harry Diamond Laboratories is in the process of preparing the required site-specific environmental documentation for the electromagnetic pulse test facility. Any

impacts cited in the operational environmental impact statement in preparation would be mitigated in ERIS testing.

Environmental consequences of launching targets for ERIS from Vandenberg Air Force Base/Western Test Range are expected to be insignificant. The launching of Minuteman missiles is a continuing acceptable use and represents no significant impacts to air, biological, or other environmental resources. However, overall operations at Vandenberg Air Force Base are contributing to regional overdrawing of the aquifers used for water supply. Continued regional consumption at current rates could cause depletion of the aquifer.

The use of the Western Test Range for ERIS activities will be in connection with launches from Vanderberg Air Force Base. The impacts on Western Test Range operation from ERIS activities are deemed insignificant.

Environmental consequences at the U.S. Army Kwajalein Atoll may be significant. Launch facilities would have to be refurbished. This refurbishment is addressed in a "Record of Environmental Consideration" and the resulting "Categorical Exclusion #7." Additional support personnel would be required, which in turn would necessitate new housing and infrastructure. New housing requirements have been identified for Kwajalein Island. The "Environmental Assessment for Family Housing Dwellings, FY 1987-1989 Phases, Kwajalein Island, Kwajalein Missile Range, Kwajalein Atoll, Marshall Islands" addresses the impacts of housing construction on Kwajalein Island. Those impacts were deemed mitigable and not significant. In addition to new housing, increased infrastructure requirements on Kwajalein Island would be met with the following planned construction: expansion of an existing power plant and a desalinization facility. An environmental assessment has been prepared for the construction and operation of the expanded power plant. The environmental assessment concluded that all potential impacts are mitigable and the action does not constitute a major Federal action with potential for significant impact on the environment.

Activities associated with ERIS Demonstration/Validation at the U.S. Army Kwajalein Atoll are currently estimated to result in a 285-person increase in staff and their dependents residing at the facility, a growth of 11.7 percent over the most recent available population figures (2,432 persons on 30 June 1986). The total population would be below the highest population figure of nearly 6,000 people in 1972. Such an increase may create significant demands on existing infrastructure support or significant additional socioeconomic impacts. Specific areas of consideration are:

- Air Quality: The 1979 estimates of emissions from the Kwajalein Island power plant showed emissions reaching the limits for nitrogen oxide standards. The planned power plant expansion would be required to meet emission limitations. The environmental assessment for the expanded power plant concluded that with the implementation of mitigation measures emissions standards would be met.

- Water Quality: Available data from 1976 indicate that water quality was being degraded as a result of toxic metal leaching from a solid waste disposal site used by U.S. Army Kwajalein Atoll. Subsequently a wall was constructed. Although the wall was installed on the ocean side of the landfill, visual inspection

indicated direct seepage to the ocean was occurring (88). The source of the leachate was considered to be waste oil or sewage tank pumpage. The landfill is currently used for disposal of building material and ERIS activities are expected to continue this use. The potential change in rate of seepage from the landfill as a result of disposal of construction wastes from activities in support of Demonstration/Validation is unknown. Indirect water quality impacts from potential increased population on Ebeye Island have not been evaluated in previous documents.

- o Biological Resources: If coral is used for housing or other construction, dredging of coral from surrounding reefs could result in degradation of the marine habitat. However, the harvesting can be accomplished in a manner that will ensure that critical habitats of marine biota are not degraded. Degradation of water quality resulting from leachate seepage from the landfill could adversely impact marine biota. Indirect impacts on marine resources from potential increased population on Ebeye Island have not been evaluated in previous documents.

- o Infrastructure:

  - -- Electricity demands associated with the 11.7 percent facility population increase would require increased power plant generating capacity. One concern is the nitrogen oxide emissions which is considered mitigable by the measures described in the environmental assessment.

  - -- Solid waste demands associated with the increase in facility population would be accommodated by the existing waste disposal system.

  - -- Sewage treatment demands from increased facility population are not expected to result in an increase in sewage treatment demands beyond capacity.

  - -- Water-supply demands would be increased. The planned construction of a desalinization facility on Kwajalein Island is projected to ensure sufficient potable water without degrading groundwater resources.

  - -- Transportation demands may require additional ferry service to Kwajalein Island from Ebeye for increased Marshallese staff.

- o Hazardous Waste: Hazardous waste produced is not expected to significantly impact the treatment, storage, and disposal provisions as outlined in the Hazardous Waste Management Plan that is in preparation.

- o Socioeconomics: Significant socioeconomic consequences could result from the anticipated 11.7 percent increase of U.S. Army Kwajalein Atoll staff (and their dependents) in support of ERIS. Although the new jobs created for the Marshallese could have positive short-term impacts, which should be complemented by the

Job Corps Program recently implemented by the U.S. Army Kwajalein Atoll, their presence may attract more Marshallese from other islands to Ebeye Island. Increased population on Ebeye could add to its already excessively dense population, providing increased pressure on its inadequate public facilities and housing, and causing public health to fall further below currently unsatisfactory levels. Increased activity at the U.S. Army Kwajalein Atoll could increase Marshallese economic dependence on DoD expenditures. The U.S. Army Kwajalein Atoll currently has a policy limiting the number of Marshallese employed, which may minimize the amount of influx of people to Ebeye Island.

No significant impacts are anticipated to land use, visual resources, cultural resources, or noise because the proposed tests would be similar to current activities that do not now have significant impacts at the U.S. Army Kwajalein Atoll.

In recognition of the need to avoid, minimize and mitigate any potential adverse impacts on the environment of the Kwajalein Atoll, the U.S. Army will prepare a comprehensive environmental impact statement addressing the continuing operations at the U.S. Army Kwajalein Atoll, which include the proposed Demonstration/Validation activities. The environmental impact statement will address the environmental concerns recognized in this Environmental Assessment and will to identify appropriate mitigations.

The environmental consequences of launching targets at the U.S. Naval Pacific Missile Range Facility at Barking Sands are considered to be mitigable. Additional launch facilities would have to be constructed to accommodate launching of intermediate-range boosters. The "Preliminary Environmental Assessment, Kauai Test Facility, Barking Sands, Kauai, Hawaii" was prepared for the construction and operation of the Intermediate-Range Booster System Facilities and concluded that no significant impacts are to be expected from the proposed action. Air and water quality and biological resource impacts from construction activities are mitigable by standard control measures. Land use conflicts are mitigable by an agreement currently being negotiated between the facility and the County of Kauai and by continued clearing of beach areas before and during launches. No significant impacts are expected on infrastructure, hazardous waste, visual resources, cultural resources, noise, or socioeconomics.

If the no-action alternative is selected, no significant environmental impacts are anticipated, as current Concept Exploration activities would continue with utilization of current staffing and facilities.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Development of the ERIS through the Demonstration/Validation stage would result in irreversible and irretrievable commitment of resources such as electronic components, various metallic and nonmetallic structural materials, fuel, and labor. This commitment of resources is not different from those necessary for many other aerospace research and development programs; it is similar to the activities that have been carried out in previous aerospace programs over the past several years.

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1. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The National Environmental Policy Act, the Council on Environmental Quality regulations implementing the Act (40 CFR 1500-1508), and the Department of Defense (DoD) Directive 6050.1 which supplements these regulations, direct that DoD officials take into account environmental consequences when authorizing or approving major Federal actions in the United States. Accordingly, this Environmental Assessment analyzes the potential environmental consequences of a proposed transition from Concept Exploration to Demonstration/Validation of the Exoatmospheric Reentry Vehicle Interception System (ERIS), one of the technologies being considered in the Strategic Defense Initiative program. The tests and evaluations associated with Demonstration/Validation will be in accordance with the Antiballistic Missile Treaty and are currently structured to conform to the restrictive interpretation of the Treaty. The decision to proceed to Demonstration/Validation for ERIS would not preclude other technologies, nor would it mandate the eventual Full-Scale Development or Production/Deployment of ERIS.

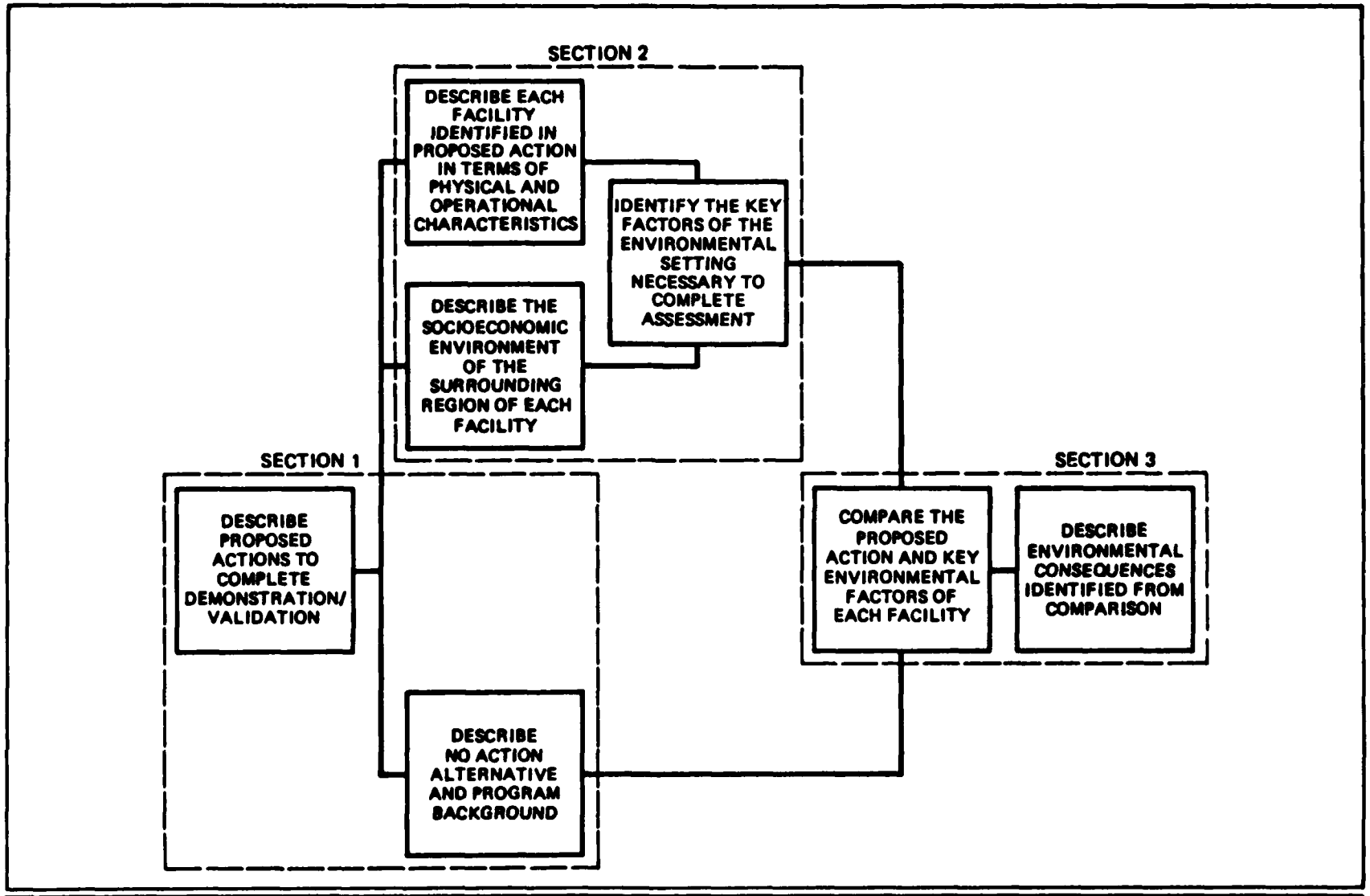
The approach followed to complete this assessment is presented in Figure 1-1. This section describes the test and evaluation activities that would be completed for ERIS and identifies the contractor and government facilities where the activities would be carried out. Section 2 characterizes those facilities and the surrounding communities, and Section 3 assesses the potential environmental consequences of the activities.

Demonstration/Validation of the ERIS technology would consist of a number of tests. Descriptions of these tests were developed from documentation describing the ERIS Demonstration/Validation program and interviews with program personnel who developed the documentation. Section 1.3 describes the types of tests and their locations. Also, where possible, other factors related to the tests, such as work force or hazardous materials requirements, have been described.

The remainder of this section briefly describes the background of the Strategic Defense Initiative program, the purpose of and need for the ERIS technology, the proposed action, and the no-action alternative.

1.1 BACKGROUND

The President's announcement of a Strategic Defense Initiative on March 23, 1983, initiated an extensive research program to determine the feasibility of developing an effective ballistic missile defense system to protect the United States and its allies from enemy missile attack. The Strategic Defense Initiative Organization was established to plan, organize, coordinate, direct, and enhance the research and testing of technologies applicable to strategic defense. Future implementation of a Strategic Defense System would be based on the Strategic Defense Initiative research program.



GENERAL APPROACH TO COMPLETE ENVIRONMENTAL ASSESSMENT

FIGURE 1-1

1.1.1 Classes of Architecture

The Strategic Defense Initiative has produced several candidate architecture options and has promoted advanced technology concepts to support these architectures. The term "architecture" refers to the function and interrelationship of individual elements or subsystems within a possible system. To date, three classes of possible architecture have been defined (69):

- Combined space-based and ground-based sensors and weapons to counter long-range ballistic missiles
- Ground-based weapons to counter long-range ballistic missiles
- Airborne sensors and ground-based weapons to counter shorter-range tactical ballistic missiles.

The combined space- and ground-based architectures would employ a series of satellites to sense, track, and destroy the threatening missiles and reentry vehicles (i.e., warheads) in the boost, post-boost, or midcourse phase of their trajectory. A ground-based system, which would back up the satellites, would intercept warheads in the latter part of their flight. Early evolving systems for both space- and ground-based architectures would use kinetic-energy weapons; later systems may use directed-energy weapons (lasers or particle beams).

As currently envisioned, the ground-based architecture could meet an offensive missile in the midcourse and reentry phases, although boost-phase intercept capability (by use of ground-based directed-energy weapons) is currently being investigated. A series of satellites would provide early warning, and a ground-based intercept vehicle would then destroy the incoming warhead.

The third architecture would use airborne sensors to track shorter-range tactical ballistic missiles and ground-based weapons for target destruction. The shorter flight times of tactical ballistic missiles would require fast identification, tracking, discrimination, and reaction, which in turn would require greater sensor sensitivity and faster data processing.

Many technologies are currently being investigated to support the three architectures described above. Among the technologies being considered for Demonstration/Validation are spacebased technologies:

- Boost Surveillance and Tracking System (BSTS)
- Space-based Surveillance and Tracking System (SSTS)
- Space-Based Interceptor (SBI)

and ground-based technologies:

- Exoatmospheric Reentry Vehicle Interception System (ERIS)
- Ground-based Surveillance and Tracking System (GSTS)
- Battle Management Command, Control, and Communications (BM/C^3).

Among the ground-based technologies, the ERIS would employ ground-based missiles to intercept and destroy intercontinental and submarine- launched ballistic missiles during the midcourse and late midcourse phases of their trajectory. If deployed, each ERIS intercept missile would be composed of a lightweight launch vehicle (booster) and a homing kinetic-energy weapon. The launch vehicle is in the conceptual stage of development; no testing of the vehicle will occur during Demonstration/Validation.

The homing kinetic-energy weapon of the ERIS would consist of a general processor, an infrared sensor, a signal processor, an inertial measurement unit, a propulsion and reaction control system, and a communications subsystem. The linkage between the general processor, the infrared sensor, and the signal processor would enable the weapon to locate the target. The inertial measurement unit, which would be linked directly to the general processor, would be a navigational tool that senses changes in the inertial state of the ERIS vehicle. The combination of the sensor/general processor and the inertial measurement unit/propulsion and reaction control would provide the homing ability of the ERIS system. The communications subsystem would receive messages from BM/C^3.

This Environmental Assessment addresses the ERIS technology. Separate Environmental Assessments have been prepared for the other technologies being considered for Demonstration/Validation. The potential cumulative environmental effects of testing several technologies at the same facility are addressed in the Strategic Defense Initiative Demonstration/Validation Program Environmental Assessments Summary.

The Defense Acquisition Board will decide whether the ERIS technology is ready to proceed to Demonstration/Validation based on examination of cost, schedule, readiness objectives, affordability, initial operational capability, conceptual soundness, and environmental consequences.

1.1.2 Stages of Strategic Defense Initiative Development

DoD Directive 5000.1 calls for a staged approach to the DoD acquisition process. In keeping with that mandate, DoD's major system acquisition process consists of four distinct stages: Concept Exploration, Demonstration/Validation, Full-Scale Development, and Production/Deployment. These four stages are separated by three major decision points (Milestones I, II, and III). Prior to Milestone I, the Defense Acquisition Board will review the results of Concept Exploration and decide whether the subject technology will be carried forward into Demonstration/Validation or remain in the Concept Exploration stage. The ERIS Strategic Defense Initiative technology is approaching the end of Concept Exploration and preparing for Demonstration/Validation.

In Demonstration/Validation, the ERIS technology would be tested to demonstrate its ability to perform the task. The Demonstration/Validation stage for the ERIS technology includes the following test techniques:

1. Analyses: Examining and evaluating data to define or refine the current knowledge of a technology

2. Simulations: The use of software models representing both the test article and the environment to determine performance abilities

3. Component/Assembly Tests: Demonstrating performance of components and assemblies under simulated conditions, such as space or battle environments

4. Flight Tests: The use of flight-qualified devices and assemblies in real flight environments to verify performance.

Some ERIS Demonstration/Validation activities may require modifications or additions to existing government facilities. Should this occur, the need for supplemental environmental evaluation would be determined in conformance with Council on Environmental Quality and DoD regulations.

1.2 PURPOSE AND NEED

The purpose of the Demonstration/Validation program for ERIS is to determine the ability of the technology to perform its intended function, and to provide the information necessary to make an informed decision whether to proceed with Full-Scale Development. These activities are the first steps needed to support a decision to develop, produce, and deploy the ERIS technology, which is integral to an effective strategic defense.

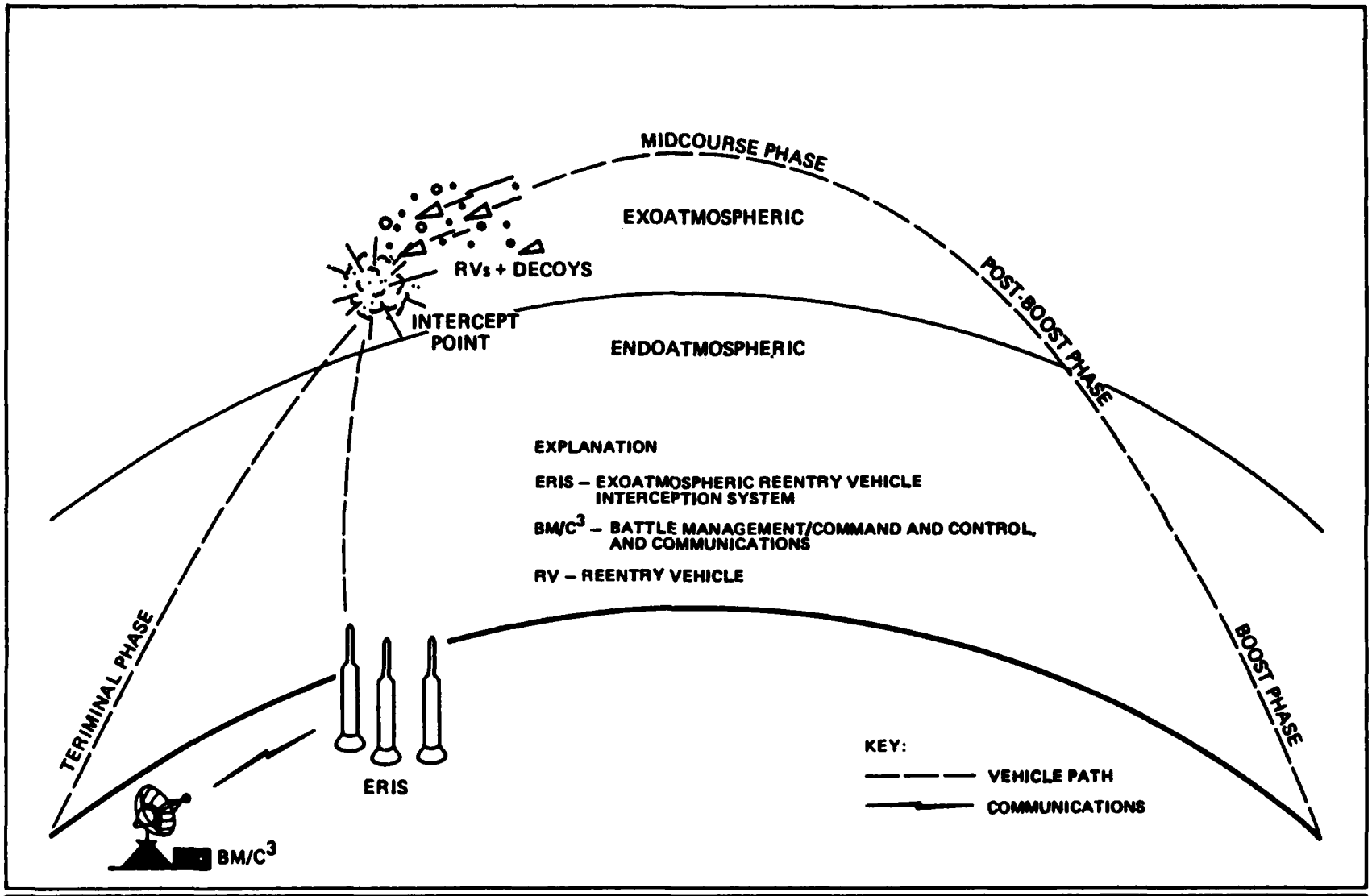
The function of ERIS would be to intercept and destroy hostile intercontinental or submarine-launched reentry vehicles in the midcourse phase of their flight (Figure 1-2). The ERIS would provide a necessary element of one alternative architecture of the proposed Strategic Defense System.

1.3 PROPOSED ACTION

The proposed action is the Demonstration/Validation program for the ERIS technology. This program would demonstrate whether the system can meet its specific performance requirements and would provide the information necessary for the Defense Acquisition Board to recommend a Milestone II decision to proceed into Full-Scale Development.

Demonstration/Validation of ERIS would require fabrication and ground testing of a limited capability homing kinetic-energy weapon composed of a sensor, general processor, signal processor, guidance and control subsystem, and communications subsystem. The homing kinetic-energy weapon would then be flight tested in a series of four to seven launches. The fabrication and ground testing of the weapon would take place in existing contractor and government facilities. Flight testing would require modification of existing launch facilities at one or two DoD installations.

To date, Concept Exploration activities for ERIS have included development of a candidate homing kinetic-energy weapon. The candidate weapon is capable of performing the required functions, but further simulation, ground testing, and



FUNCTIONAL CONCEPT OF
EXOATMOSPHERIC REENTRY VEHICLE INTERCEPTION SYSTEM

FIGURE 1-2

flight testing is required. Demonstration/Validation of the ERIS is needed to address the following technological issues:

- o General Processor Hardware: Test the durability, fault tolerance, and reliability of the microprocessors.
- o Sensor Error: Verify that the error is small enough that the weapon is capable of intercepting the target.
- o Communications Subsystem: Verify the ability to accept instructions to divert or abort.

The Demonstration/Validation testing activities for the ERIS program fall into four categories: analyses, simulations, component/assembly tests, and flight tests. Each of these categories specific to ERIS is described in greater detail in Appendix A. The ERIS test activities and their locations are described in Table 1-1. The following paragraphs provide additional descriptions of the test activities where such descriptions are appropriate. Figure 1-3 presents the locations of the test facilities.

1.3.1 Analyses

Two test activities within the ERIS program would consist of analyses as described in Table 1-1. In one activity, the ability of ERIS to find a target based on data from a sensor system would be partially determined by analytical methods. In another activity, data from ERIS flight tests would be stored for later applications to refine the ERIS technology.

1.3.2 Simulations

Simulations create a digital representation of the physical world using specially developed computer software. Each simulation assigns a specific value to all physical parameters in the simulated system; these values are changed in subsequent simulations to determine: (1) how each parameter affects the simulated system, and (2) the optimal value for each parameter for maximum system efficiency.

Simulations would be conducted to characterize the performance of the homing kinetic-energy using a "Threat Object Map." All exercises using computer models would be conducted at the ERIS Integrated Test Facility, at Lockheed Missiles and Space Company in Sunnyvale, California.

ERIS flight test data would be used for simulations at the National Test Facility to analyze the results of one flight test and to initiate improvements in the succeeding tests.

1.3.3 Component/Assembly Tests

The objective of component/assembly testing is to control some particular aspect of the physical environment surrounding a hardware component being

TABLE 1-1.
DEMONSTRATION/VALIDATION TESTING FOR THE EXOATMOSPHERIC REENTRY VEHICLE INTERCEPTION SYSTEM

TEST ACTIVITIES	TEST TECHNIQUES				LOCATIONS[1]
	Analyses	Simulations	Component/ Assembly	Flight	
Missile (booster) ability to respond to Inflight Guidance Update Data		X			ERIS Integrated Test Facility, Lockheed Missiles and Space Company[2]
				X	U.S. Army Kwajalein Atoll[3,4]
				X	Vandenberg Air Force Base/Western Test Range
				X	Pacific Missile Range Facility[4]
Determine allowable error in target location data for successful interception		X			ERIS Integrated Test Facility, Lockheed Missiles and Space Company[2]
				X	U.S. Army Kwajalein Atoll[3,4]
				X	Vandenberg Air Force Base/Western Test Range
				X	Pacific Missile Range Facility[4]

[1] Adequate facilities exist unless otherwise noted.

[2] Lockheed Missiles and Space Company has certified compliance with all Federal, State, and local environmental laws and regulations.

[3] Use of the U.S. Army Kwajalein Atoll for flight testing also requires launching dedicated targets from Vandenberg Air Force Base using the Western Test Range, and possibly from the Pacific Missile Range Facility at Barking Sands.

[4] Facility construction or modification required (excluding minor modification).

TABLE 1-1 (Continued).
DEMONSTRATION/VALIDATION TESTING FOR THE EXOATMOSPHERIC REENTRY VEHICLE INTERCEPTION SYSTEM

TEST ACTIVITIES	TEST TECHNIQUES				LOCATIONS[1]
	Analyses	Simulations	Component/ Assembly	Flight	
Homing kinetic-energy weapon ability to seek out target		X			ERIS Integrated Test Facility, Lockheed Missiles and Space Company[2]
				X	U.S. Army Kwajalein Atoll[3,4]
				X	Vandenberg Air Force Base/Western Test Range
				X	Pacific Missile Range Facility
Homing kinetic-energy weapon ability to find target based on Threat Object Map	X	X			ERIS Integrated Test Facility, Lockheed Missiles and Space Company[2]
				X	U.S. Army Kwajalein Atoll[3,4]
				X	Vandenberg Air Force Base/Western Test Range
				X	Pacific Missile Range Facility[4]

[1] Adequate facilities exist unless otherwise noted.

[2] Lockheed Missiles and Space Company has certified compliance with all Federal, State, and local environmental laws and regulations.

[3] Use of the U.S. Army Kwajalein Atoll for flight testing also requires launching dedicated targets from Vandenberg Air Force Base using the Western Test Range, and possibly from the Pacific Missile Range Facility at Barking Sands.

[4] Facility construction or modification required (excluding minor modification).

TABLE 1-1 (Continued).
DEMONSTRATION/VALIDATION TESTING FOR THE EXOATMOSPHERIC REENTRY VEHICLE INTERCEPTION SYSTEM

TEST ACTIVITIES	TEST TECHNIQUES: Analyses	Simulations	Component/ Assembly	Flight	LOCATIONS[1]
Hardware components of the homing kinetic-energy weapon ability to function individually			Dynamic Chamber		ERIS Integrated Test Facility, Lockheed Missiles and Space Company[2]
Guidance and control system ability to respond to signals and to Threat Object Map		X			ERIS Integrated Test Facility, Lockheed Missiles and Space Company[2]
			Wind Tunnel		Arnold Engineering Development Center
				X	U.S. Army Kwajalein Atoll[3,4]
				X	Vandenberg Air Force Base/Western Test Range
				X	Pacific Missile Range Facility[4]

[1] Adequate facilities exist unless otherwise noted.

[2] Lockheed Missiles and Space Company has certified compliance with all Federal, State, and local environmental laws and regulations.

[3] Use of the U.S. Army Kwajalein Atoll for flight testing also requires launching dedicated targets from Vandenberg Air Force Base using the Western Test Range, and possibly from the Pacific Missile Range Facility at Barking Sands.

[4] Facility construction or modification required (excluding minor modification).

TABLE 1-1 (Continued).
DEMONSTRATION/VALIDATION TESTING FOR THE EXOATMOSPHERIC REENTRY VEHICLE INTERCEPTION SYSTEM

TEST ACTIVITIES	TEST TECHNIQUES				LOCATIONS[1]
	Analyses	Simulations	Component/ Assembly	Flight	
Guidance and control system ability to maneuver		X			ERIS Integrated Test Facility, Lockheed Missiles and Space Company[2]
				X	U.S. Army Kwajalein Atoll[3,4]
				X	Vandenberg Air Force Base/Western Test Range
				X	Pacific Missile Range Facility[4]
Integration of all components of the homing kinetic-energy weapon			Dynamic Chamber		ERIS Integrated Test Facility, Lockheed Missiles and Space Company[2]
				X	U.S. Army Kwajalein Atoll[3,4]
				X	Vandenberg Air Force Base/Western Test Range
				X	Pacific Missile Range Facility[4]

[1] Adequate facilities exist unless otherwise noted.

[2] Lockheed Missiles and Space Company has certified compliance with all Federal, State, and local environmental laws and regulations.

[3] Use of the U.S. Army Kwajalein Atoll for flight testing also requires launching dedicated targets from Vandenberg Air Force Base using the Western Test Range, and possibly from the Pacific Missile Range Facility at Barking Sands.

[4] Facility construction or modification required (excluding minor modification).

TABLE 1-1 (Continued).
DEMONSTRATION/VALIDATION TESTING FOR THE EXOATMOSPHERIC REENTRY VEHICLE INTERCEPTION SYSTEM

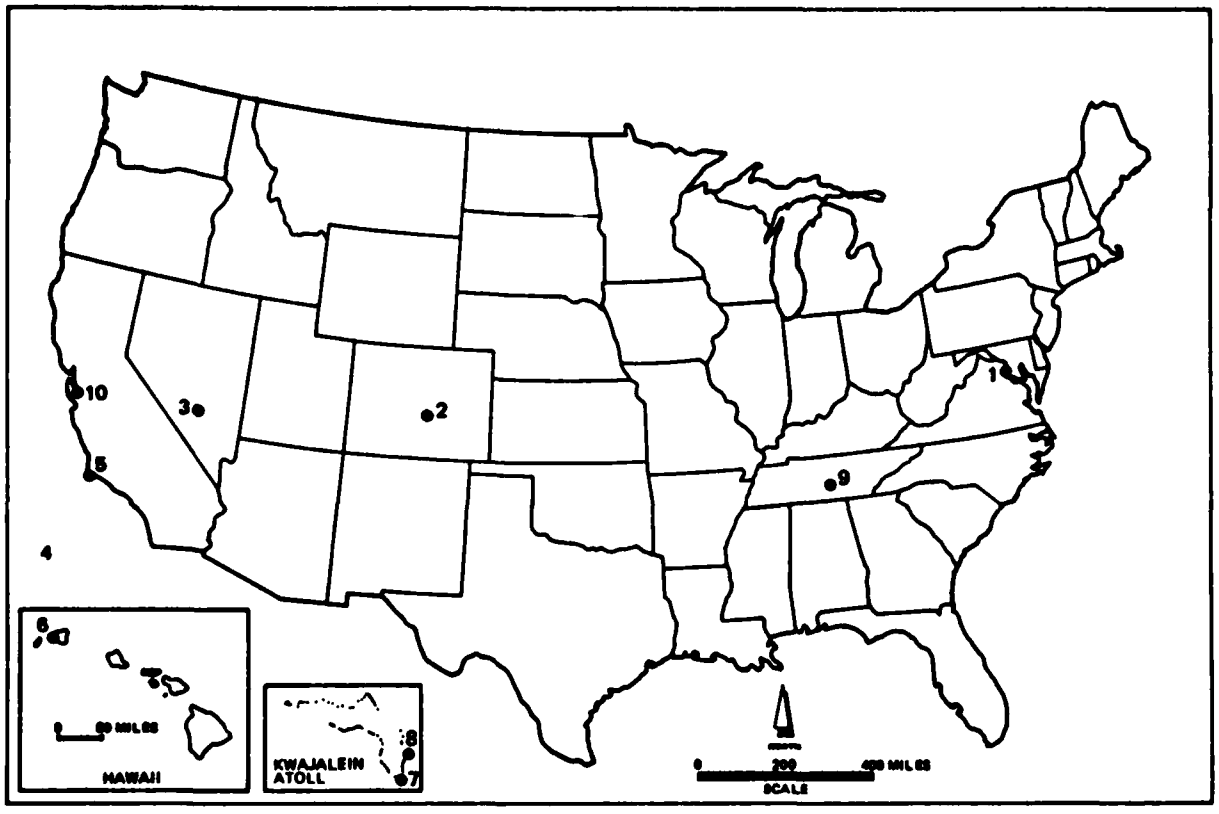
TEST ACTIVITIES	TEST TECHNIQUES				LOCATIONS[1]
	Analyses	Simulations	Component/ Assembly	Flight	
Determine ability of circuitry to withstand nuclear environment			Broad Spectrum Radiation		Nevada Test Site
			Radiation Chamber/ Electromagnetic Pulse Test Facility		Harry Diamond Laboratories
Analysis and storage of data from flight tests	X	X			National Test Facility[4]

[1] Adequate facilities exist unless otherwise noted.

[2] Lockheed Missiles and Space Company has certified compliance with all Federal, State, and local environmental laws and regulations.

[3] Use of the U.S. Army Kwajalein Atoll for flight testing also requires launching dedicated targets from Vandenberg Air Force Base using the Western Test Range, and possibly targets from the Pacific Missile Range Facility at Barking Sands.

[4] Facility construction or modification required (excluding minor modification).



FACILITY

1. HARRY DIAMOND LABORATORIES
2. NATIONAL TEST FACILITY
3. NEVADA TEST SITE
4. WESTERN TEST RANGE
5. VANDENBERG AFB
6. U.S. NAVAL PACIFIC MISSILE RANGE FACILITY AT BARKING SANDS

U.S. ARMY KWAJALEIN ATOLL

7. KWAJALEIN ISLAND
8. MECK ISLAND
9. ARNOLD ENGINEERING DEVELOPMENT CENTER
10. LOCKHEED MISSILES AND SPACE COMPANY

EXOATMOSPHERIC REENTRY VEHICLE INTERCEPTION SYSTEM DEMONSTRATION/VALIDATION FACILITIES

FIGURE 1-3

developed. During the test, data are collected on the environment and the performance of the hardware component being tested. A chamber generally represents the environment; the hardware component is subjected to the environment and the response of the hardware is recorded and analyzed for future modifications.

The wind tunnel test at the Arnold Engineering Development Center would evaluate the guidance and control system in various flow fields. The homing kinetic-energy weapon would encounter various velocities following separation from the booster in the high atmosphere.

Radiation testing of the circuitry in the homing kinetic-energy weapon would evaluate the survivability of the circuits when exposed to radiation. This testing would occur at two facilities. At the Nevada Test Site it would take advantage of underground nuclear tests already scheduled for other programs. The radiation chamber and the electromagnetic pulse test facility at Harry Diamond Laboratories would also be used to test the survivability of the circuits.

1.3.4 Flight Tests

Flight tests are conducted within a missile range that generally consists of a launch area with launch pads or silos, associated launch control and support facilities, a safety area around the launch area, and a controlled land/sea/air area for flight and impact.

ERIS Flight tests would involve one launch with no target and up to seven target launches and attempted intercepts, with the objective of obtaining four successful intercepts. All ERIS launches, using an Aries booster (Minuteman I second and third stages) would be from Meck Island in the U.S. Army Kwajalein Atoll. An existing missile silo used for the Homing Overlay Experiment would be modified to provide the launch facility for ERIS flight tests. The first four dedicated target launches have been scheduled from Vandenberg Air Force Base. If more than four target launches are required, up to three additional target launches would be scheduled. If there are Vandenberg Air Force Base scheduling restrictions, Polaris A-3 missiles may be launched as targets from the Intermediate-Range Booster System facilities being built at the U.S. Naval Pacific Missile Range Facility at Barking Sands. Flight and intercept testing would occur over the Western Test Range.

The ERIS launch without a target would verify test elements such as the launch facility, and test data recovery and observation systems. The target intercept flights would test the component performance of:

- o Missile performance
  - inflight guidance update
  - pre-launch target location error
- o Homing Kinetic-Energy Weapon performance
  - maneuvering after booster separation
  - response to Threat Object Map
  - guidance and control systems
  - response to divert order.

1.4 NO-ACTION ALTERNATIVE

The no-action alternative is to continue with Concept Exploration activities without progressing to the Demonstration/Validation stage at this time.

2. ENVIRONMENTAL SETTING

The test activities of the ERIS Demonstration/Validation program and the facilities where they would be conducted are identified in Table 1-1. Some tests would be conducted at the contractor facility of Lockheed Missiles and Space Company in Sunnyvale, California. Other tests would be conducted at government facilities at Arnold Engineering Development Center, National Test Facility, Nevada Test Site, Harry Diamond Laboratories, Vandenberg Air Force Base/Western Test Range, U.S. Army Kwajalein Atoll, and U.S. Naval Pacific Missile Range Facility at Barking Sands. This section describes the environmental setting of each government facility in terms of physical and operational characteristics, permit status, and previous environmental documentation. Specific physical characteristics include: facility size, base and test facilities, and environmental conditions. Operational characteristics include the socioeconomic variables of staffing, payroll, and housing and the infrastructure characteristics of electricity, solid waste, sewage treatment, transportation, and water supply.

Permits described are those that relate to air quality, water quality, and hazardous waste. Previous environmental documentation includes environmental compliance plans, base master plans, environmental assessments, and environmental impact statements. The socioeconomic characteristics of the counties and communities surrounding the facility are also presented.

The data for each planned test facility are presented in tables and figures. The level of detail in these tables reflects the availability of pertinent program and facility information.

Many of the tests for the ERIS Demonstration/Validation program would be completed at an existing contractor facility, specifically the ERIS Integrated Test Facility at the Lockheed Missiles and Space Company in Sunnyvale, California. This facility was originally designed and built for testing associated with the Homing Overlay Experiment (32); it is adequate for completing all proposed analyses, simulations, and component/assembly tests for the ERIS. The ERIS Integrated Test Facility is a commercial/industrial operation that existed at the time the contract was awarded. The Lockheed Missiles and Space Company obtained all applicable Federal, State, and local permits and authorizations necessary for facility operation as part of the conditions of the contract.

The methodology used in developing the descriptions of government facilities that would be used in the program involved identifying and acquiring available literature such as environmental assessments, environmental impact statements, and base master plans. The literature was reviewed and data gaps (i.e., questions that could not be answered from the literature) were identified. To fill the data gaps, facility personnel were interviewed by telephone. Where this report utilizes information collected through telephone interviews, appropriate references are presented in the List of References, Section 6; primary contacts for each facility are listed in Section 5. The following subsections describe the environmental setting of each of the government facilities where Demonstration/Validation activities are planned.

Ten areas of environmental consideration are addressed: (1) air quality; (2) water quality; (3) biological resources; (4) infrastructure: electricity, solid waste, sewage treatment, water supply, transportation; (5) hazardous waste; (6) land use; (7) visual resources; (8) cultural resources; (9) noise; and (10) socioeconomics.

Several of the resource areas, specifically air and water quality, are regulated by federally mandated standards. The treatment, storage, and disposal of hazardous wastes are also regulated by Federal standards. Where federally mandated standards do not exist, qualitative evaluations were made. A discussion of each resource area is provided below.

Air Quality

Air quality concerns at each facility were evaluated in terms of the National Ambient Air Quality Standards and the location of the facility in an attainment or nonattainment area. For existing air emissions sources, the facility was evaluated for the emissions standards contained in the associated State Implementation Plan. Possible air emissions sources, such as expansion of facilities and new construction, were evaluated using the New Source Review requirements.

Water Quality

Water quality concerns at each location were identified and the facility's record of compliance with permits is presented.

Biological Resources

The Endangered Species Act protects plants and animals threatened with extinction. A review of the environmental documentation of the geographic area surrounding the facility was conducted to determine the documented presence of threatened and endangered species.

Infrastructure

Electricity, solid waste, sewage treatment, water supply, and transportation are infrastructure requirements that ultimately limit the capacity for growth. Capacity and current demand are described for each facility.

Hazardous Waste

The Resource Conservation Recovery Act regulates how a facility can dispose of its hazardous waste. The record of compliance was reviewed to determine the facility's capability to handle any additional wastes, and to determine any potential disposal problems.

Land Use

Base master plans, environmental management plans, and other documentation were reviewed to determine any current conflicts between the facility and local standards, and to evaluate the probability of conflict resulting from any planned expansions.

Visual Resources

Existing environmental documentation was reviewed to determine if aesthetic concerns were an issue at any of the facilities.

Cultural Resources

Existing environmental documentation was reviewed to determine if any significant cultural resources in proximity to the facilities would be affected by test activities.

Noise

Existing environmental documentation was reviewed to determine if noise concerns were an issue at any of the facilities.

Socioeconomics

Key socioeconomic indicators (population, housing, employment, and income data) for the supporting region of each facility were examined to evaluate the potential consequences of increased population, expenditures, and employment.

2.1 ARNOLD ENGINEERING DEVELOPMENT CENTER

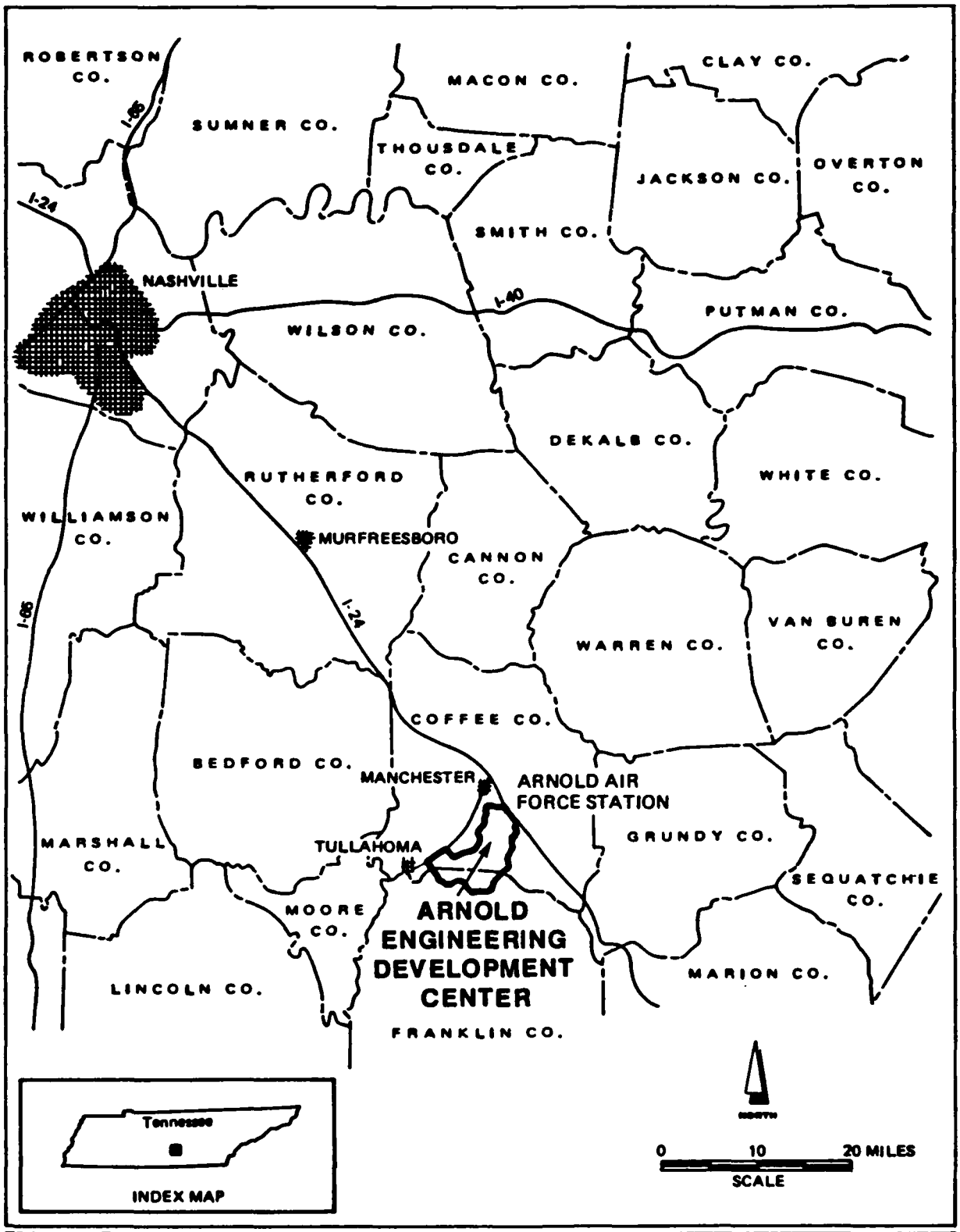
Arnold Engineering Development Center is located at Arnold Air Force Station, approximately 7 miles southeast of Manchester, Tennessee (Figure 2-1). Arnold Engineering Development Center is the nation's largest complex of wind tunnels, jet and rocket engine test cells, space simulation chambers, and hyper-ballistic ranges (76). The wind tunnels at Arnold Engineering Development Center are routinely used to test missile components and assemblies in an environment that simulates actual high-speed flight. A description of the Arnold Engineering Development Center and its environment is presented in Table 2-1.

For socioeconomic purposes, the supporting region for Arnold Engineering Development Center is defined as Coffee and Franklin Counties and the nearby communities of Manchester and Tullahoma. Selected socioeconomic data for these areas are presented in Table 2-2.

Based on available data, Arnold Engineering Development Center is in compliance with Federal standards for air quality, water quality, and hazardous waste (8, 14, 28). Environmental consequences of facility operation will be addressed in an ongoing revision of an existing environmental assessment (Formal Environmental Assessment for Arnold Engineering Development Center Operations, February 1977) (8). Copies of that document, when complete, will be available from the Arnold Engineering Development Center Public Affairs Office.

2.2 NATIONAL TEST FACILITY

The National Test Facility will be constructed at Falcon Air Force Station (78). An interim facility will be operated out of the existing Consolidated



LOCATION MAP OF ARNOLD ENGINEERING DEVELOPMENT CENTER AT ARNOLD AIR FORCE STATION, TENNESSEE

FIGURE 2-1

TABLE 2-1
SELECTED ENVIRONMENTAL CHARACTERISTICS
ARNOLD ENGINEERING DEVELOPMENT CENTER

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	39,081 acres (Arnold AFS); main laboratory is a 3,000-acre fenced compound.	26, 79
		BASE FACILITIES	3,000 acre fenced main laboratory area, 6,000-foot airstrip, test and administration buildings, recreation areas, 4,000 acre Wood's Reservoir	79
		TEST FACILITIES	40 aerodynamic and propulsion wind tunnels, 11 rocket and turbine engine test cells, 4 ballistic and impact ranges, 2 arc heaters and 4 space environment chambers	79
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	Wood cutting permits are sold to general public for cutting firewood in designated areas. The Wildlife Management Program restocks fish in Wood's Reservoir. Recreational facilities for Air Station personnel and general public available at Reservoir. 1,400 acres are under sharecropper permits with local farmers.	26, 79
		VISUAL RESOURCES	The Air Force Station is located within a rural area characterized by gentle hills, 30,000 acres of hardwood forest, and the 4,000-acre Wood's Reservoir. The research area is screened by pine forest along the access road.	26, 79
		SPECIAL STATUS	Federally listed endangered species: Gray Bat, Indiana Bat, Red-Cockaded Woodpecker. There are two designated wetland areas, no designated historical or archaeological sites.	16, 26, 79
		NOISE	Work at Arnold Engineering Development Center creates noise in excess of safety levels within the test areas. The noise problems are minimized by a 6,000-acre dense pine plantation around AEDC, the location of the site 5 miles from the nearest town, selective scheduling of operations, and mufflers for facility exhausts.	8, 26, 75, 79
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	Civilian = 307, Military = 163, Contractor = 3,779 (1986)	6
		PAYROLL	Air Force = $16.0 million; Contractor = $232 million (1986)	6
		HOUSING	Officer = 24, NCO = 16, Transient = 47 (1986)	6

TABLE 2-1 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
ARNOLD ENGINEERING DEVELOPMENT CENTER

				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Daily consumption = 250,000 kWh, Daily capacity = 600,000 kWh; supplied by the Tennessee Valley Authority	39
		SOLID WASTE	One landfill on base, contracted to the city of Tullahoma, will reach capacity by December 1987. Future disposal sites to be determined by contractor.	39
		SEWAGE TREATMENT	Design capacity for main plant = 2.89 million gallons/day Current use = 0.21 million gallons/day	7
		TRANS-PORTATION	Interstate 24 and other Federal and State highways provide access to the site. Traffic has been no problem.	26, 55
		WATER SUPPLY	Demand = 1.07 million gallons/day Capacity = 2.75 million gallons/day	7
PERMIT STATUS		AIR	27 current PSD permits; the ambient air quality of the area is within attainment of air quality standards.	8, 26
		WASTE WATER	Eight current NPDES permits; one violation in December 1986 for excessive infiltration.	8, 14
		HAZARDOUS WASTE	A TSD facility; total hazardous waste generated 119,000 pounds; submitted RCRA Part B in August 1985 and is awaiting public notification. Minor corrective actions will be required for prior, non-groundwater contaminating releases.	8, 28
ADDITIONAL ENVIRONMENTAL INFORMATION			Environmental Compliance Plan currently under development; Base Master Plan currently under revision; Existing EA; formal EA for AEDC Operations, revision of February 1977, currently undergoing another revision; EA for Elk Resource Recovery Facility, AEDC; 1984 Environmental Quality Program, Arnold AFS; Environmental Statement, National Guard Use of AEDC, April 1972; Environmental Impact on Noise from the Proposed AEDC High Reynolds Number Tunnel, March 1973.	8, 26, 75, 79
COMMENTS			Test Facility for SSTS is still in the design phase; the environmental group at Arnold has been tasked with writing the required EA.	15

TABLE 2-2.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
ARNOLD ENGINEERING DEVELOPMENT CENTER

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
Coffee County					
Population	32,572	38,311	40,126	1.64	1.16
Year-Round Housing	11,104	14,967	N/A	3.03	N/A
Vacancy Rate (%)	8.4	8.8	N/A	--	--
Civilian Labor Force	12,685	17,703	21,163	3.39	4.56
Unemployment (%)	4.5	6.8	8.7	--	--
Per Capita Income ($)[1]	2,479	6,153	8,027	--	--
Median Family Income ($)[1]	7,668	16,516	N/A	--	--
Franklin County					
Population	27,289	31,983	33,123	1.60	0.88
Year-Round Housing	8,767	11,570	N/A	2.81	N/A
Vacancy Rate (%)	6.8	6.7	N/A	--	--
Civilian Labor Force	10,390	13,790	12,956	2.87	-1.55
Unemployment (%)	5.3	9.3	10.9	--	--
Per Capita Income ($)[1]	2,108	5,544	7,106	--	--
Median Family Income ($)[1]	6,599	15,576	N/A	--	--
Manchester					
Population	6,810	7,250[2]	7,445	0.63	0.67
Year-Round Housing	2,175[2]	2,954[2]	N/A	3.11[2]	N/A
Vacancy Rate (%)	N/A	9.7[2]	N/A	--	--
Civilian Labor Force	N/A	N/A	N/A	N/A	N/A
Unemployment (%)	N/A	N/A	N/A	--	--
Per Capita Income ($)[1]	N/A	6,685	8,837	--	--
Median Family Income ($)[1]	N/A	15,260	N/A	--	--

References: 62, 63, 64, 66, 73

[1] Income figures refer to preceding year

[2] "Total Housing Units"

TABLE 2-2 (Continued).
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
ARNOLD ENGINEERING DEVELOPMENT CENTER

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
Tullahoma					
Population	15,311	15,800	16,535	0.31	1.14
Year-Round Housing	5,223[2]	6,236[2]	N/A	1.79[2]	N/A
Vacancy Rate (%)	N/A	7.2[2]	N/A	--	--
Civilian Labor Force	N/A	N/A	N/A	N/A	N/A
Unemployment (%)	N/A	N/A	N/A	--	--
Per Capita Income($)[1]	N/A	6,691	8,650	--	--
Median Family Income ($)[1]	N/A	15,292	N/A	--	--

References: 62, 63, 64, 66, 73

[1] Income figures refer to preceding year

[2] "Total Housing Units"

Space Operations Center, also located at Falcon Air Force Station. This facility is in El Paso County, Colorado, about 12 miles east of Colorado Springs (Figure 2-2). The present mission of the Consolidated Space Operations Center is to provide support for military space operations through communications centralization and data link operations. The facility and its environmental characteristics are described in Table 2-3.

The Consolidated Space Operations Center was built to house two mission elements: the Satellite Operations Center and the Space Shuttle Operations Center (80). The former performs command, control, and communications service functions for orbiting spacecraft. The latter was to conduct DoD Shuttle flight planning, readiness, and control functions. The interim National Test Facility could be located at the Consolidated Space Operations Center because adequate support facilities are available (85).

For the purpose of socioeconomic assessment, the supporting region for this facility is defined as the surrounding El Paso County and the nearby community of Colorado Springs. Selected socioeconomic data for these areas are contained in Table 2-4.

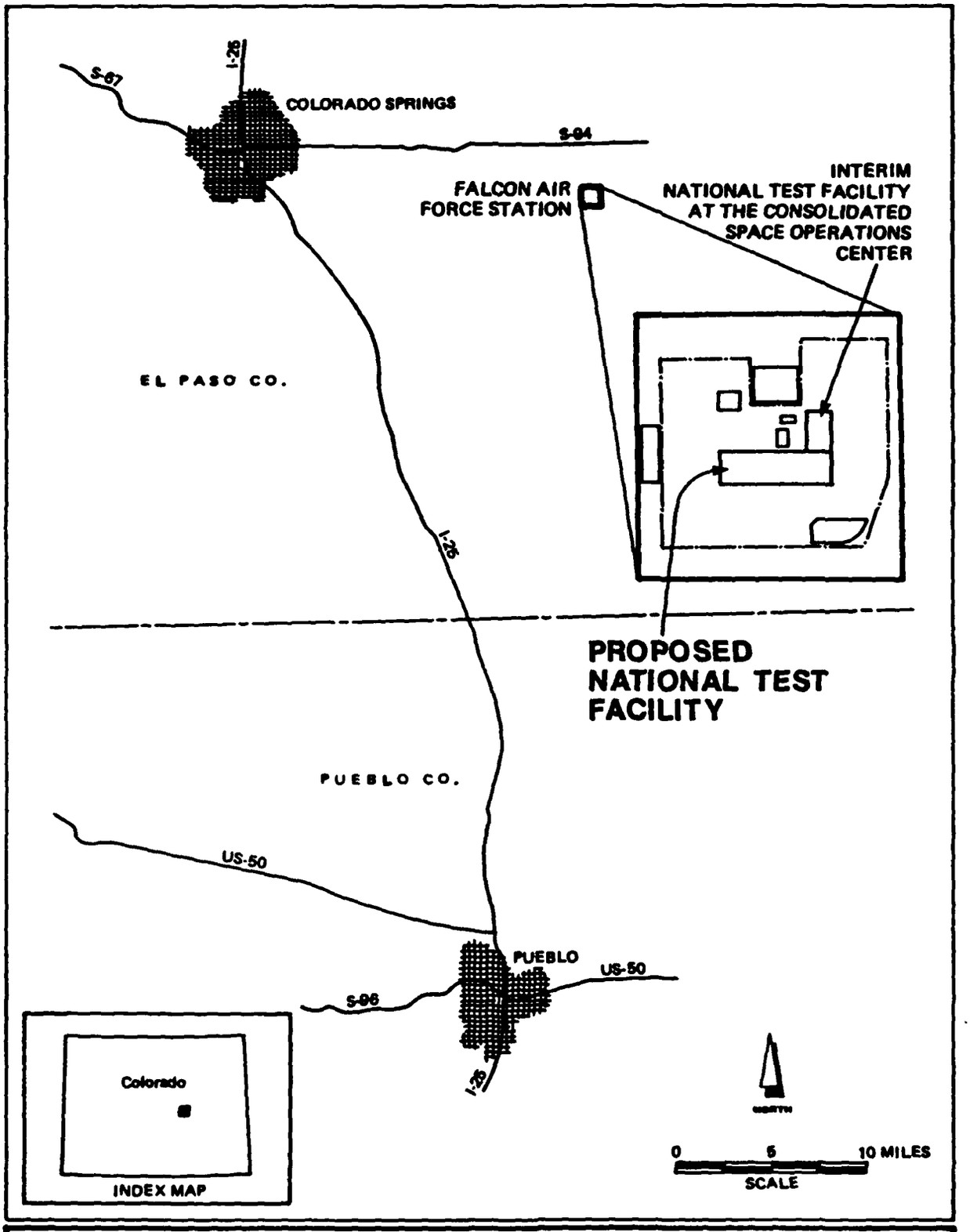
Based on available data, the Falcon Air Force Station, including the Consolidated Space Operations Center and the proposed location of the National Test Facility, is in compliance with Federal standards for air quality, water quality, and hazardous waste. Environmental documentation has been prepared for both the National Test Facility (National Test Facility Environmental Assessment) (78) and for the interim National Test Facility at the Consolidated Space Operations Center (Categorical Exclusion, control number AFSPC 86-1) (85).

2.3 NEVADA TEST SITE

The Nevada Test Site is located adjacent to the Nellis Air Force Range approximately 65 miles northwest of Las Vegas in southeastern Nye County, Nevada (Figure 2-3) (99). The Nevada Test Site, 864,000 acres in size, operates facilities for underground testing of nuclear devices and weapons testing. Exposure of materials and components to nuclear radiation is often an integral part of a nuclear test. A description of the facility and its environment is presented in Table 2-5.

For purposes of socioeconomic assessment, the supporting region for the Nevada Test Site is defined as Nye County, where the facility itself is located, as well as Clark County and its main population center, Las Vegas, located to the southeast. Selected socioeconomic data for these areas are presented in Table 2-6.

Based on available data, the Nevada Test Site is in compliance with Federal standards for air quality, water quality, and hazardous waste (70, 100). Environmental documentation has been prepared for the Nevada Test Site (Final Environmental Impact Statement, ERDA-155, September 1977) (18).



LOCATION MAP OF NATIONAL TEST FACILITY AT FALCON AFS, COLORADO

FIGURE 2-2

TABLE 2-3
SELECTED ENVIRONMENTAL CHARACTERISTICS
NATIONAL TEST FACILITY

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	640 acres	3
		BASE FACILITIES	Administrative offices, communications network	78
		TEST FACILITIES	Advanced communications network capabilities	78
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	None on facility	12
		VISUAL RESOURCES	Region consists of gently rolling plains characterized by semiarid grasslands used for agricultural grazing; Falcon Air Force Station is considered developed, as high-technology buildings and support facilities dominate the landscape.	78
		SPECIAL STATUS	None on facility	12
		NOISE	Current ambient noise level is 40 L_{dn}, which is below acceptable limits.	11
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	Military = 895, Active Duty; Civilian = 2,088 (1987, at Falcon Air Force Station)	27
		PAYROLL	$0.9 Million (1987; Civilian payroll, at Falcon Air Force Station)	27, 95
		HOUSING	Officer = 106; NCO = 384; Transient = 130; (1987; at Peterson Air Force Base, no known housing at Falcon Air Force Station)	27

TABLE 2-3 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
NATIONAL TEST FACILITY

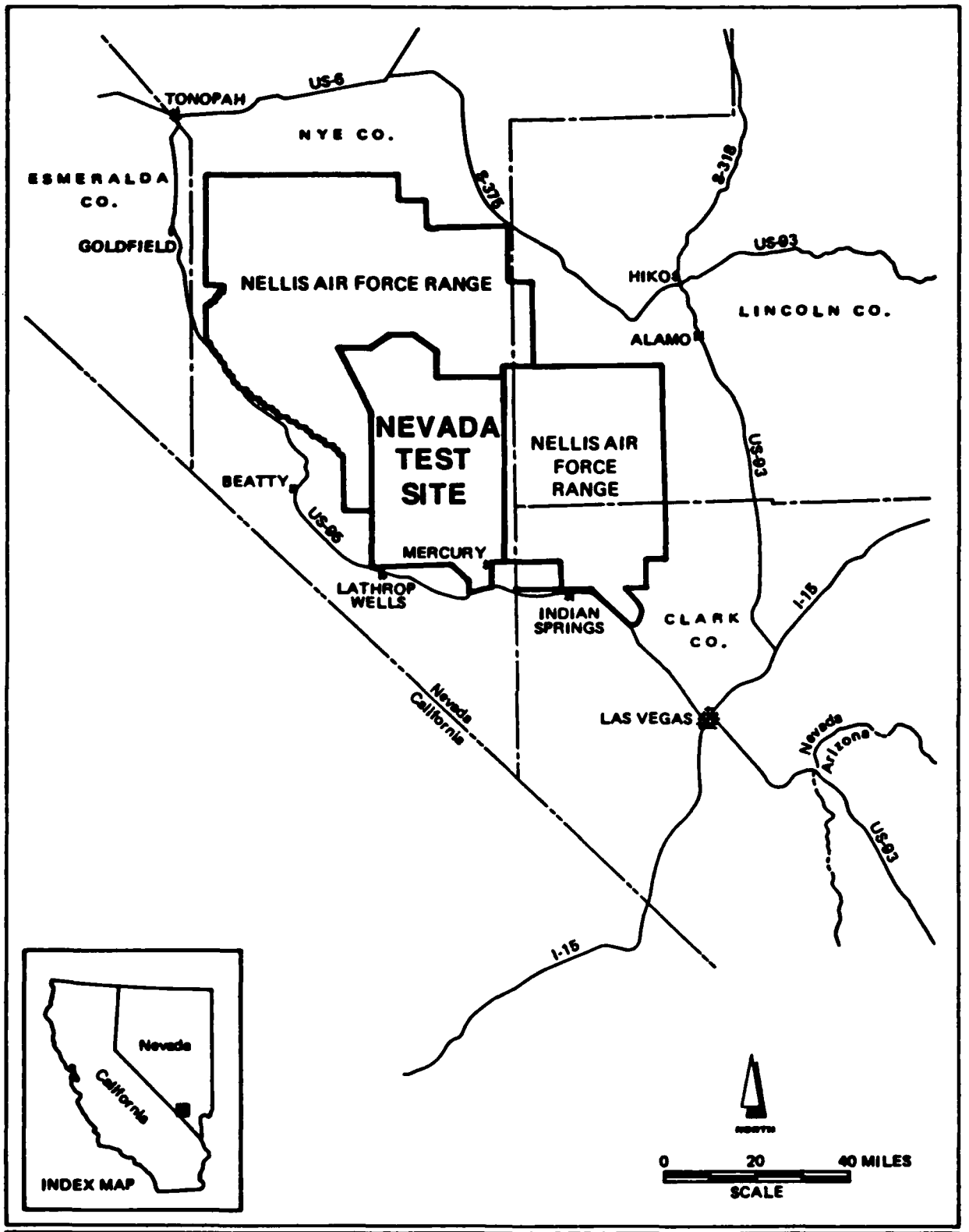
				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Peak daily demand = 6,100 kWh for Consolidated Space Operations Center; Capacity = 15,000 kW; can be expanded to 25,000 kW	78
		SOLID WASTE	Disposed offsite at licensed landfill by private contractor	11
		SEWAGE TREATMENT	Design capacity = 0.069 millon gallons/day; designed to support 2,300 Base personnel	78
		TRANS-PORTATION	Access to Falcon AFS provided by State Highway 94 and Enoch Road. Current traffic at Enoch Road = 1,550 vehicles/day, capacity 11,300 vehicles/day. Current traffic at SH 94 = 3,500 vehicles/day, capacity 16,000 vehicles/day.	78
		WATER SUPPLY	The Cherokee Water District contract with Falcon Air Force Station limits delivery of water to 0.479 million gallons per day. Existing peak water demands at the installation are estimated at 0.409 million gallons per day.	78
PERMIT STATUS		AIR	Attainment by Colorado standards (Falcon AFS is located outside the Colorado Springs non-attainment areas for carbon monoxide and total suspended particulates)	11
		WASTE WATER	NPDES Permit is in place for wastewater that is discharged offbase into lagoons.	11
		HAZARDOUS WASTE	Potential Hazardous Wastes: electrolytes, sodium hydroxide, sodium sulphide, dichlorodiflouromethane, sulfur dioxide, SSP-55 all in very small amounts; offsite disposal by Defense Reutilization Management Office	11, 13
ADDITIONAL ENVIRONMENTAL INFORMATION	No environmental compliance plan available. The Base Master Plan is being developed and is expected to be completed in June 1988; there are no land use or zoning conflict issues. Current EA: National Test Bed Program, 1987; Final Environmental Impact Statement, Consolidated Space Operations Center, January, 1981			12, 78
COMMENTS	National Test Facility has categorical exclusion as stated in document 813 (control # AFSPC 86-1) dated 8-12-86. Data is for Falcon Air Force Station, unless otherwise noted.			85, 101

TABLE 2-4.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
NATIONAL TEST FACILITY

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
El Paso County					
Population	235,972	309,424	349,066	2.75	3.06
Year-Round Housing	72,913	116,770	N/A	4.82	N/A
Vacancy Rate (%)	7.3	7.7	N/A	--	--
Civilian Labor Force	71,085	130,297	163,883	6.25	5.90
Unemployment (%)	5.5	7.6	5.4	--	--
Per Capita Income($)[1]	2,920	7,027	9,812	--	--
Median Family Income ($)[1]	8,974	18,729	N/A	--	--
Colorado Springs					
Population	140,512	215,105	247,739	4.35	3.59
Year-Round Housing	46,502	88,189	N/A	6.61	N/A
Vacancy Rate (%)	7.7	7.9	N/A	--	--
Civilian Labor Force	46,414	98,140	123,504	7.78	5.92
Unemployment (%)	5.7	7.4	5.3	--	--
Per Capita Income ($)[1]	3,001	7,404	10,292	--	--
Median Family Income ($)[1]	9,089	18,987	N/A	--	--

References: 62, 63, 64, 66, 73

[1] Income figures refer to preceding year



LOCATION MAP OF NEVADA TEST SITE, NEVADA

FIGURE 2-3

TABLE 2-5
SELECTED ENVIRONMENTAL CHARACTERISTICS
NEVADA TEST SITE

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	864,000 acres	99
		BASE FACILITIES	Dedicated to underground nuclear testing, development and testing of nuclear explosives for peaceful applications, and testing of weapons effects	29, 72
		TEST FACILITIES	Facilities for underground testing of nuclear devices and exposure of components to nuclear radiation	72, 99
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	Low-grade uranium and geothermal resources are found in general area, but are not currently considered economical.	72
		VISUAL RESOURCES	Located in a desert area with gently rolling topography dissected by ephemeral streams; landscape has been affected by underground blasting.	72
		SPECIAL STATUS	No federally listed threatened or endangered species listed; however, there are several candidate species. Archaeological and historical sites have been identified, but none are listed on the National Register of Historical Places.	18, 70, 72
		NOISE	Uninhabited desert, intermittent short duration noise from onsite tests	18
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	Approximately 8,000, mostly civilians	99
		PAYROLL	Data not available	
		HOUSING	Limited housing onsite	99

TABLE 2-5 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
NEVADA TEST SITE

				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Peak daily load = 37 MW; will need to upgrade capacity in the next 4-5 years	100
		SOLID WASTE	Permitted disposal onsite	100
		SEWAGE TREATMENT	Currently three ponds in use	100
		TRANS-PORTATION	700 miles of road onsite, 300 miles are paved. Funding for upgrading is available. Network is within capacity.	100
		WATER SUPPLY	Demand = 1.2 million gallons/day; capacity = 2.4 million gallons/day; supplied by 17 onsite wells.	70
PERMIT STATUS		AIR	Within attainment of all National Ambient Air Quality Standards	70
		WASTE WATER	No release of effluent to streams; no permits	70, 99
		HAZARDOUS WASTE	TSD facility with RCRA Part B permit to handle new wastes	70
ADDITIONAL ENVIRONMENTAL INFORMATION	Final Environmental Impact Statement, Nuclear Test Site, ERDA-155, September 1977			18
COMMENTS	Underground testing is conducted in the Pahute Mesa, Ranier Mesa, Yucca Flat, and Frenchman Flat areas of Nevada Test Site.			18

TABLE 2-6.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
NEVADA TEST SITE

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
Nye County					
Population	5,599	9,048	14,434	4.92	12.39
Year-Round Housing	2,093	4,202	N/A	7.22	N/A
Vacancy Rate (%)	13.4	18.3	N/A	--	--
Civilian Labor Force	2,465	4,330	3,659	5.80	-4.12
Unemployment (%)	2.8	4.7	6.3	--	--
Per Capita Income ($)[1]	3,844	7,169	8,889	--	--
Median Family Income ($)[1]	10,218	19,914	N/A	--	--
Clark County					
Population	273,288	463,087	536,473	5.42	3.75
Year-Round Housing	92,815	189,860	N/A	7.42	N/A
Vacancy Rate (%)	5.5	8.4	N/A	--	--
Civilian Labor Force	113,669	240,320	279,180	7.77	3.82
Unemployment (%)	5.2	6.4	8.6	--	--
Per Capita Income ($)[1]	3,538	8,259	9,930	--	--
Median Family Income ($)[1]	10,865	21,029	N/A	--	--
Las Vegas					
Population	125,787	164,674	183,227	2.73	2.70
Year-Round Housing	43,028	67,041	N/A	4.53	N/A
Vacancy Rate (%)	5.0	7.3	N/A	--	--
Civilian Labor Force	54,500	86,114	100,136	4.68	3.84
Unemployment (%)	5.6	6.7	9.0	--	--
Per Capita Income ($)[1]	3,614	8,135	9,795	--	--
Median Family Income ($)[1]	11,338	21,028	N/A	--	--

References: 62, 63, 64, 66, 73

[1] Income figures refer to preceding year

2.4 HARRY DIAMOND LABORATORIES

The central Harry Diamond Laboratories are located in Adelphi, Prince Georges County, Maryland, about 5 miles from Washington, D.C. (Figure 2-4). Harry Diamond Laboratories also operate a facility near Woodbridge, Virginia (the Woodbridge Research Facility). One of the principal functions of Harry Diamond Laboratories is electronic research and development in simulating nuclear effects to test nuclear hardening of materials. They have specialized facilities to test radiation effects in the Aurora Facility at Adelphi and to test the survivability of material subjected to electromagnetic pulse at the Woodbridge Research Facility. A description of the facilities at Harry Diamond Laboratories is provided in Table 2-7.

The radiation chamber at the Aurora Facility simulates gamma radiation with a non-radioactive source to evaluate the transient radiation effect on electronics (1). This type of testing takes between 3 days and 2 months, but on the average requires 2 weeks including preparation, testing, and post-test procedures (1). Harry Diamond Laboratories has a small staff dedicated to this type of testing, which takes place year-round on a schedule that is booked years in advance (1).

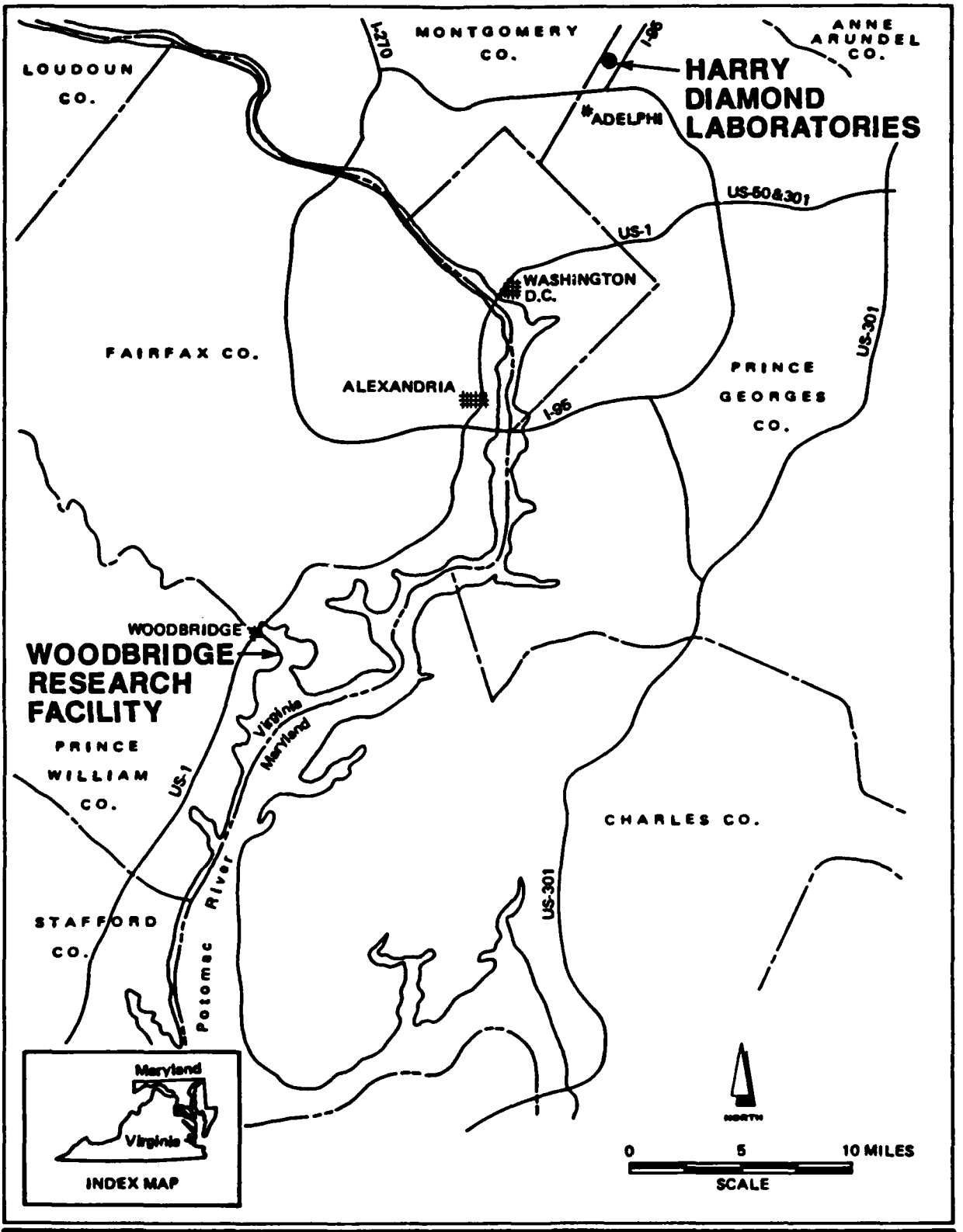
The electromagnetic pulse test facility at the Woodbridge Research Facility simulates the effects of an electromagnetic pulse that would be created by a nuclear blast (60). The effectiveness of hardening techniques is tested at the Woodbridge Research Facility. Testing in the five electromagnetic pulse simulators is ongoing on a daily basis and the staff at the Woodbridge Research Facility is dedicated to the testing activities (45).

For the purpose of socioeconomic assessment, the supporting region for this facility is defined as the Washington, D.C., Metropolitan Statistical Area. Selected socioeconomic data for this area are contained in Table 2-8.

Based on available data, Harry Diamond Laboratories at Adelphi, including the Aurora Facility, are in compliance with Federal standards for air and hazardous waste. The Adelphi site is generally in compliance with water quality standards, except during heavy rains that cause the water table to rise. The Woodbridge Research Facility is in compliance for air quality, water quality, and hazardous waste.

Environmental documentation has been prepared for Harry Diamond Laboratories, Adelphi site (Installation Assessment, 1981; Analyses of Existing Facilities/ Environmental Assessment, 1980) (19, 58).

Electromagnetic pulse test facilities are the subject of a civil action (No. 87-0642, Foundation on Economic Trends, et al., Plaintiffs, v. Caspar W. Weinberger, et al., Defendants) for failure to provide adequate and required National Environmental Policy Act environmental documentation on their electromagnetic pulse program (94). The staff at Harry Diamond Laboratories are currently in the process of preparing the required site-specific environmental documentation (26).



LOCATION MAP OF HARRY DIAMOND LABORATORIES, MARYLAND AND VIRGINIA

FIGURE 2-4

TABLE 2-7
SELECTED ENVIRONMENTAL CHARACTERISTICS
HARRY DIAMOND LABORATORIES

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	Adelphi: 137 acres Woodbridge: 579	24, 58, 59
		BASE FACILITIES	Adelphi: Admin. bldgs., circuit board lab, machine shop, explosive handling, storage and processing bldg., cobalt 60 bldg., world's largest x-ray facility Woodbridge: Electromagnetic pulse tester, disassembly bldg., 5 main admin. bldgs., 5 small bldgs.	1, 24, 58, 59
		TEST FACILITIES	Adelphi: X-ray facility (can hold Army tank), radiation testing, nuclear hardening test Woodbridge: Nuclear hardening tests	24, 58, 59
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	Adelphi: Timber, natural trout stream (Paint Branch Creek) Woodbridge: Timber	24
		VISUAL RESOURCES	Adelphi: Forested, rural setting in suburban housing development. Woodbridge: Gentle rolling hills with one timber stand, on peninsula surrounded by Marumsco Creek and the Potomac River; antenna platforms create a visual impact on the horizon--they cannot be screened.	24, 58, 59
		SPECIAL STATUS	Adelphi: No known threatened or endangered species or cultural resources on facility. Woodbridge: No known threatened and endangered species on facility, Bald Eagle sighted, wildlife refuge borders north side of facility. Approximately 150 acres classified as wetlands, tidal marsh, and/or swamp. One recorded state historical site (graveyard).	24, 58, 59
		NOISE	No noise impacts in any of the sites. Woodbridge site has a minimum 200 foot buffer zone.	24, 58, 59
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	40 military, 1,797 civilian	45
		PAYROLL	$53 million	45
		HOUSING	Adelphi: None on facility; Woodbridge: Nine family housing units that are owned by Ft. Belvoir	45, 58, 59

TABLE 2-7 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
HARRY DIAMOND LABORATORIES

				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Adelphi: Current demand = 6,900 kW, Current capacity = 22,400 kW, service supplied by the Potomac Electric Power Company and six standby generators. Woodbridge: Current demand = 366 kW, Current capacity = 10,000 kW	2, 24, 58, 59
		SOLID WASTE	Adelphi: Disposed offsite by contractor. Woodbridge: Disposed offsite through private contractor.	24, 58, 59
		SEWAGE TREATMENT	Adelphi: Current use = 120,000 gallons/day. Washington Suburban Sanitary Commission restricts volume received to maximum total average daily volume of 60,000 gallons; peak daily volume not to exceed twice that amount. 100,000 gallon storage tank on facility prevents exceedances. Woodbridge: Service supplied by Occoquan Woodbridge Sanitary District. Current demand does not exceed capacity.	23, 24, 58, 59
		TRANS-PORTATION	Adelphi: Two road entrances to facility, traffic becomes heavy at shift times. Woodbridge: Rural roads, no traffic; railroad could block emergency road route.	24, 58, 59
		WATER SUPPLY	Adelphi: Current use is 120,000 gallons/day. Water is purchased from the Washington Suburban Sanitary Commission, which does not guarantee the delivery of any specific pressure or quantity of water to the facility; no problems with water supply since 1973. Woodbridge: Supplied by Occoquan Woodbridge Sanitary District	24, 58
PERMIT STATUS		AIR	Adelphi: Five current air permits for smoke stacks from the boiler plants; permits only enacted when burning No. 2 heating oil; State controlled, no violations. Woodbridge: No air permits required for facility.	24
		WASTE WATER	Adelphi: Have one NPDES permit for oil/water interceptor; has compliance problems with heavy rains due to water table rise. Woodbridge: No NPDES permits.	24
		HAZARDOUS WASTE	Adelphi: Has a hazardous waste storage facility with Part A on file. Part B was submitted 3 years ago, still pending. Wastes currently controlled by an open-ended consent order. Woodbridge: No hazardous waste.	24
ADDITIONAL ENVIRONMENTAL INFORMATION	Analyses of Existing Facilities/Environmental Assessment: Harry Diamond Laboratories, Adelphi; Woodbridge Research Facility. Final EIS, Formation of U.S. Army Electronic Research and Development Command, August 1976			58, 59
COMMENTS	- Fire protection water hydrant system is inadequate at Woodbridge; may be subject to water pressure fluctuation problems at Adelphi site; - The Foundation on Economic Trends has filed suit on DoD for inadequate NEPA documentation for the Electromagnetic Pulse Tester; Harry Diamond Laboratories currently in process of upgrading documentation.			24, 58, 59, 94

TABLE 2-8.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
HARRY DIAMOND LABORATORIES

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
Washington, D.C. Metropolitan Statistical Area					
Population	3,040,307	3,250,489	3,249,400	0.67	-0.01
Year-Round Housing	N/A	1,244,915	N/A	N/A	N/A
Vacancy Rate (%)	N/A	5.8	N/A	--	--
Civilian Labor Force	N/A	1,752,000	N/A	N/A	N/A
Unemployment (%)	N/A	4.2	N/A	--	--
Per Capita Income ($)[1]	N/A	10,084	N/A	--	--
Median Family Income ($)[1]	N/A	27,404	N/A	--	--

[1] Income figures refer to preceding year

References: 62, 64

2.5 VANDENBERG AIR FORCE BASE/WESTERN TEST RANGE

Vandenberg Air Force Base is located on the coast of California 55 miles north of Santa Barbara (Figure 2-5). Vandenberg Air Force Base is the third largest air base in the United States and occupies 98,400 acres along 35 miles of Pacific coastline within Santa Barbara County. It is the Strategic Air Command's pioneer missile base and the headquarters of the 1st Strategic Aerospace Division and the Space and Missile Test Organization (84). Facilities house DoD, government, and civilian contractors and provide the necessary support for missile test launches. A description of the facility and its environment is presented in Table 2-9.

Existing launch facilities are scheduled to test launch intercontinental ballistic missiles, including the Minuteman, Peacekeeper, Atlas, and Scout (50). Launch facilities for the Space Shuttle are not operational, but are maintained. Current plans are to refurbish Titan Complex 4E for launches of the Titan IV or construct a new facility (10). The refurbished facility is due to be operational around 1990 (10).

The Western Test Range includes a broad area of the Pacific Ocean that extends offshore from Vandenberg Air Force Base on the coast of California (Figure 2-6) to the Indian Ocean. The range functions as the test area for space and missile operations. It includes a network of tracking and data gathering facilities throughout California, Hawaii, and the South Pacific, supplemented by instrumentation on aircraft (56). Launch and spacecraft operations are monitored and supported by the Air Force Satellite Control Facility, the Consolidated Space Operations Center, and the MILSTAR Satellite Communication system.

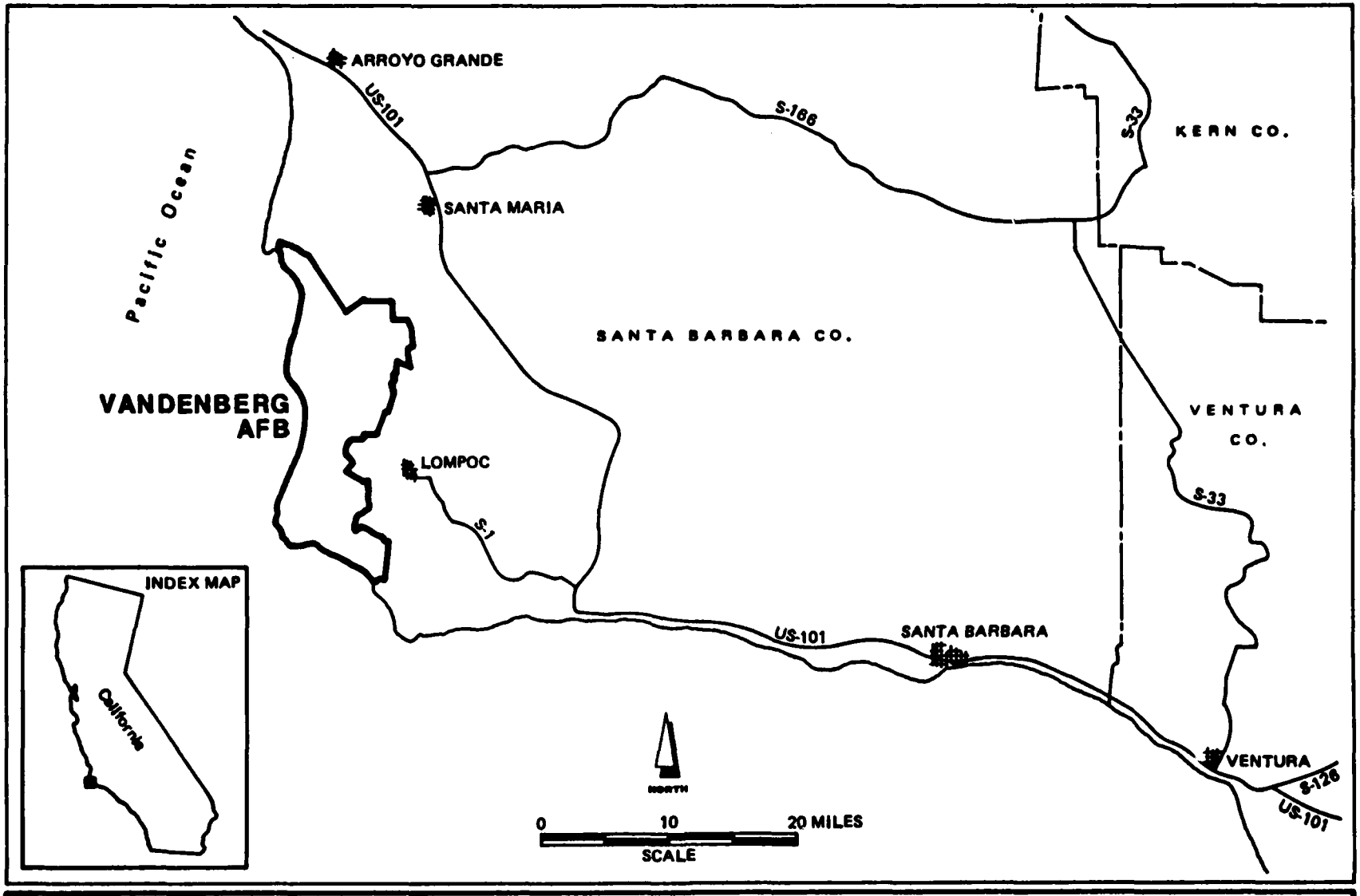
For socioeconomic purposes, the supporting region for Vandenberg Air Force Base is defined as the surrounding Santa Barbara County and the nearby communities of Lompoc and Santa Maria. Selected socioeconomic data for these areas are presented in Table 2-10.

Based on available data, Vandenberg Air Force Base is in compliance with all Federal standards for air quality, water quality, and hazardous waste. However, water is supplied by onbase wells from two aquifers which are currently overdrawn (77).

Recent environmental documents include: Draft Environmental Impact Statement, Potential Exploration, Development, and Production of Oil and Gas Resources, April 1987 (77), and Environmental Assessment for Repair and Restoration of Space Launch Complex 4, June 1987 (86). The Space Shuttle Environmental Impact Statement, 1978 (82), addresses Shuttle launches from Vandenberg Air Force Base. Impacts from MX launches are addressed in the MX Milestone II Final Environmental Impact Statement, 1978 (53, 81). An environmental impact statement is in progress for the refurbished facility for Titan IV launches (53).

2.6 U.S. ARMY KWAJALEIN ATOLL

Kwajalein Atoll is a northern atoll within the Ralik Chain of the Republic of the Marshall Islands, located east-southeast of Guam (Figure 2-7). The



LOCATION MAP OF VANDENBERG AFB, CALIFORNIA

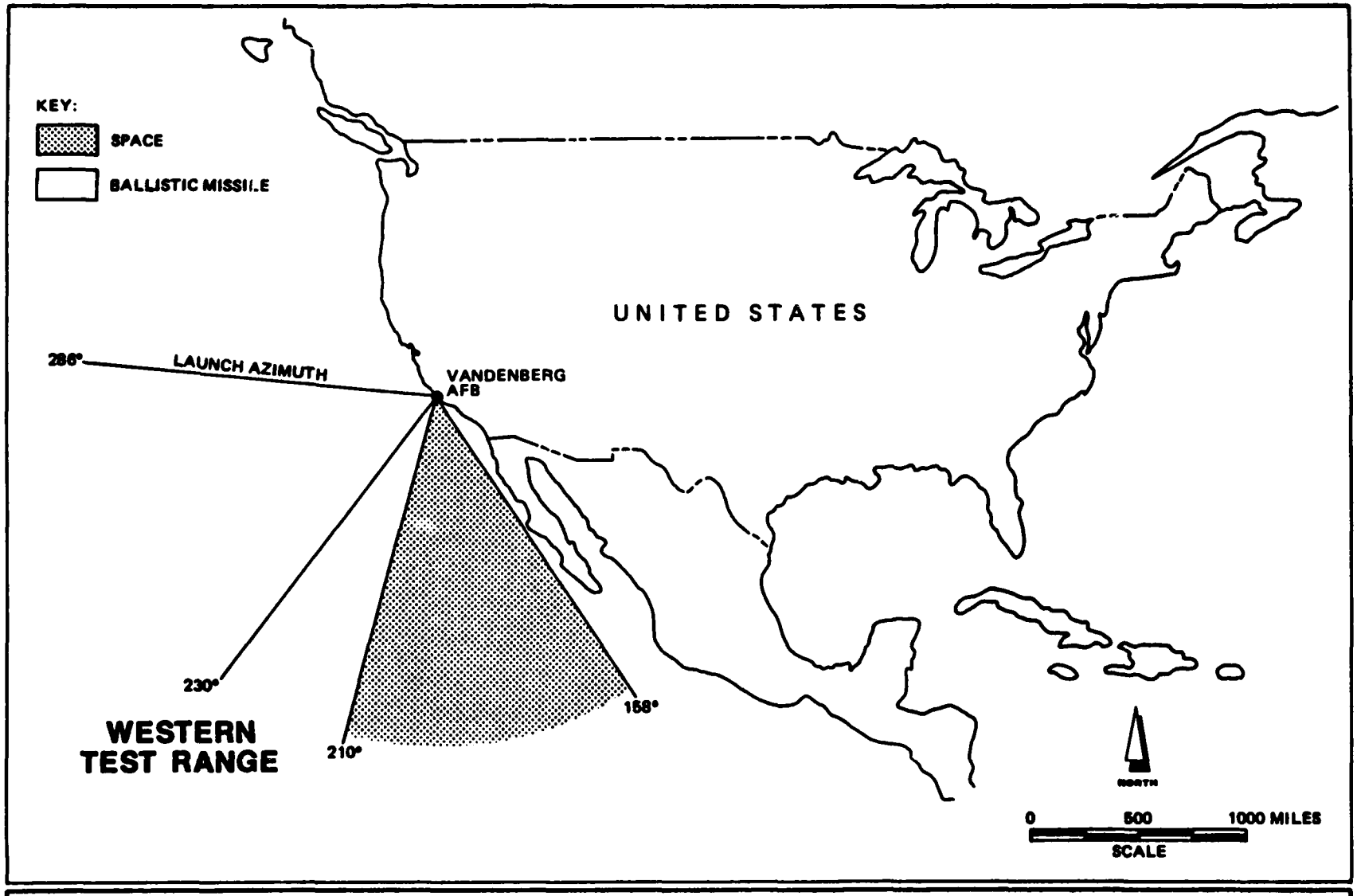
FIGURE 2-8

TABLE 2-9
SELECTED ENVIRONMENTAL CHARACTERISTICS
VANDENBERG AIR FORCE BASE

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	98,400 acres	3
		BASE FACILITIES	45-bed hospital, 6 onbase electrical power plants, 6,000-acre cantonment area, 35 missile launch sites, 15,000-foot runway	3, 77
		TEST FACILITIES	Missile assembly buildings, missile launch pads, missile control building, tracking stations	77
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	Proven onbase oil and gas reserves	77
		VISUAL RESOURCES	North Vandenberg is characterized by natural landforms consisting of rolling hills interrupted by canyons and valleys. The central cantonment area consists of residential, administrative, and industrial structures. The inland portion of south Vandenberg landscape varies from gently rolling hills to steep, sloping terrain. The coastal portion of north and south Vandenberg includes steep bluffs and canyons, rocky shorelines and promontories, beaches, river outlets, and sand dunes.	77
		SPECIAL STATUS	Over 600 known cultural resources exist on base, most of which are archaeological sites. Two sites listed on National Register of Historical Places. Federally listed endangered species include: California Brown Pelican, California Least Tern, Least Bell's Vireo, American Peregrine Falcon, and Unarmored Threespine Stickleback. Threatened species include the Southern Sea Otter and the Guadalupe Fur Seal. There are no federally listed endangered or threatened plants. 5,125 acres are designated by the U.S. Fish and Wildlife Service as wetlands. The Base also contains 35 miles of coastline, 166 miles of streams, 9,000 acres of dune habitat, and 4,200 acres of woodland.	77
		NOISE	North Vandenberg area affected by missile launches, maintenance activities, and traffic. Noise levels in cantonment area typical of residential area. South Vandenberg affected by launch facilities, traffic, and the Southern Pacific Railroad. Noise monitoring network onbase. Measured noise levels in vicinity of launch facilities range from L_{dn} 44 to L_{dn} 69, with maximum L_{dn} 120.	77
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	Military = 3,971 Civilian = 1,487 Contractor = 7,913 (1987)	27
		PAYROLL	Military and civilian $157 million; contractors $244 million (1987)	27
		HOUSING	Officers = 511; NCO = 1,567; Transient = 400; 172 mobile trailer spaces, (1987)	27

TABLE 2-9 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
VANDENBERG AIR FORCE BASE

				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Peak daily demand = 558,900 kWh; peak daily capacity = 580,000 kWh; supplied by PG&E power grid.	21, 53
		SOLID WASTE	Volume = 25,000 tons/year, capacity = 95,000 tons/year; disposed at five offsite facilities by private contractor. Three of five facilities expected to have adequate space to year 2000.	20, 77
		SEWAGE TREATMENT	Design capacity of offsite facility (serving the city of Lompoc, unincorporated areas surrounding Lompoc, and Vandenberg) is 5 million gallons/day. Onsite system treats waste from cantonment area with a capacity of 3 million gallons/day. Total sewage produced in 1986 by Vandenberg AFB was approximately 1 million gallons/day.	20, 77, 81
		TRANS-PORTATION	Road network on base has considerable excess capacity. Road network leading to base near or at capacity. Access to launch sites restricted several hours prior to launch.	53, 77
		WATER SUPPLY	10 potable wells on base supply all Vandenberg's water needs. 1,497 million gallons produced in 1986. Potable water wells and an additional 24 monitoring wells are regularly sampled. All have acceptable water quality, except for two wells in the Santa Ynez field which show excessive chromium and pesticide levels.	20, 77
PERMIT STATUS		AIR	Permits in place authorize onbase construction and operations from the Air Pollution Control District. North county portion of Santa Barbara County, which contains Vandenberg, is currently in attainment of air quality standards. Three PSD monitoring stations onbase.	40, 53, 57
		WASTE WATER	NPDES permits in place for 15 onbase sewage discharge locations	51
		HAZARDOUS WASTE	Approximately 500 tons generated per year; disposed at offsite facility by private contractor. Vandenberg has a short-term hazardous waste storage permit.	40
ADDITIONAL ENVIRONMENTAL INFORMATION	Recent (1987) Draft EIS on oil and gas exploration at Vandenberg. Existing EIS documents (1983, 1978) for MX missile and space shuttle launches from Vandenberg. EIS in progress for Titan IV launch facilities and operations.			9, 77, 81, 82, 87
COMMENTS	Missile launches have relatively little impact on air quality. Many base operations and programs were restricted in anticipation of Space Shuttle launches. Since the program has been suspended, the large amounts of offset allow for more potential emissions.			57



LOCATION MAP OF WESTERN TEST RANGE

FIGURE 2-6

TABLE 2-10.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
VANDENBERG AIR FORCE BASE

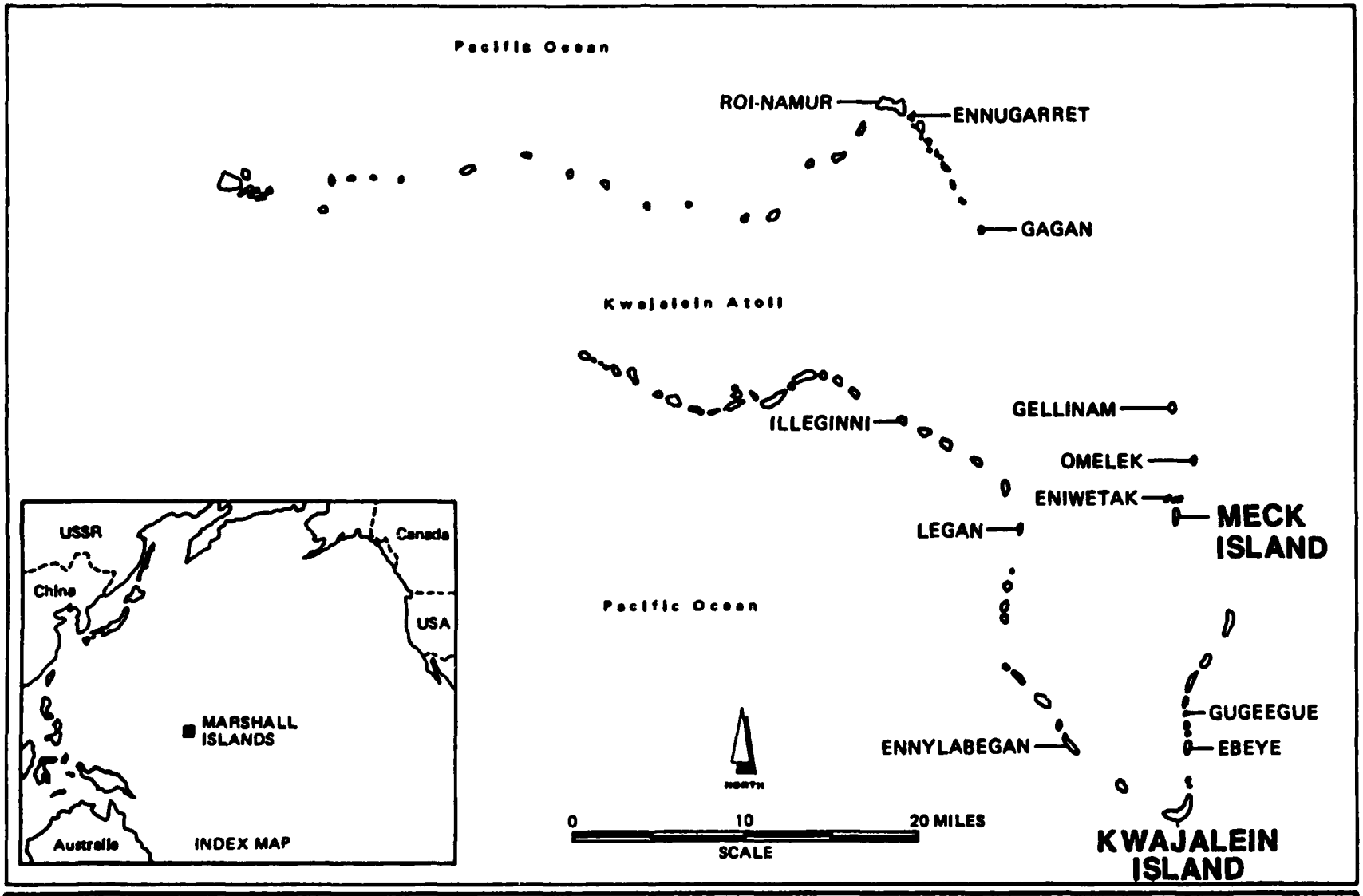
Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
Santa Barbara County					
Population	264,324	298,694	322,781[2]	1.23	1.96[3]
Year-Round Housing	88,777	114,720	123,476[2]	2.60	1.48
Vacancy Rate (%)	5.5	4.7	3.64[2]	--	--
Civilian Labor Force	101,425	145,949	167,921	3.71	3.57
Unemployment (%)	6.4	5.8	5.9	--	--
Per Capita Income [1]	3,357	8,406	11,125	--	--
Median Family Income [1]	10,451	21,630	N/A	--	--
Lompoc					
Population	25,280	26,267	29,342	0.38	2.81
Year-Round Housing	7,991	9,870	N/A	2.13	N/A
Vacancy Rate (%)	5.5	5.0	N/A	--	--
Civilian Labor Force	8,727	11,366	13,083	2.68	3.58
Unemployment (%)	9.6	9.3	9.4	--	--
Per Capita Income [1]	2,839	6,828	9,492	--	--
Median Family Income [1]	9,636	19,272	N/A	--	--
Santa Maria					
Population	32,749	39,685	46,494	1.94	4.04
Year-Round Housing	10,803	15,007	N/A	3.34	N/A
Vacancy Rate (%)	5.5	6.4	N/A	--	--
Civilian Labor Force	13,269	18,678	21,500	3.48	3.58
Unemployment (%)	8.1	9.4	9.5	--	--
Per Capita Income [1]	3,116	6,507	8,682	--	--
Median Family Income [1]	9,902	18,526	N/A	--	--

References: 62, 63, 64, 66, 73

[1] Income figures refer to preceding year

[2] 1985 data

[3] 1980-1985 annual % change



LOCATION MAP OF U.S. ARMY KWAJALEIN ATOLL
REPUBLIC OF MARSHALL ISLANDS, MICRONESIA

FIGURE 2-7

Marshall Islands were previously administered by the United States under a strategic trust established by the United Nations (41). The Compact of Free Association prepared by the government of the United States, the Marshall Islands, the Federated States of Micronesia, and Palau in 1980 established a sovereign Marshall Islands government (41). The Compact was approved by the United Nations in 1986.

Kwajalein Atoll consists of a very large interior lagoon (839 square miles) surrounded by approximately 100 component islets (41, 88). The U.S. Army Kwajalein Atoll encompasses the Kwajalein Atoll and includes facilities on the islands of Kwajalein, Roi-Namur, Ennylabegan, Meck, Ennugarret, Gagan, Gellinam, Omeleck, Eniwetak, Legan, and Illeginni (68). United States resident populations are located on Kwajalein and Roi-Namur. A description of the facility and its environment is presented in Table 2-11.

Technical facilities present on the U.S. Army Kwajalein Atoll include multiple launch facilities and numerous supporting elements such as tracking radars, optical instrumentation, and telemetry stations (68). Support services include airports, warehouses, and maintenance buildings (68). During the last decade U.S. Army Kwajalein Atoll has served an important role in research related to exoatmospheric ballistic missile defense, development of the MX missile system, and support of other advanced DoD research (68). Radars, optical instrumentation, and telemetry facilities were installed on Meck Island during this time (68). Also, major facilities have been established on Roi-Namur by the Defense Advanced Research Projects Agency. Since 1976, ballistic missile defense activities have been limited to research and technology demonstration programs (68).

For socioeconomic purposes, the supporting region for the U.S. Army Kwajalein Atoll is defined as the island of Ebeye. This is the main concentration of Marshallese at Kwajalein Atoll; although no missile range staff or dependents reside on Ebeye, the economy of this community relies almost exclusively on the range facility (88). Selected information on staffing and housing for the facility itself is contained in Table 2-11. Additional data on the socioeconomic background of Ebeye, including information on population, housing, and employment, are provided in Table 2-12.

Based on available data, it has been determined that U.S. Army Kwajalein Atoll facilities are in compliance with all applicable environmental permitting requirements except for water quality (34, 35, 88). One endangered species, the Hawksbill Turtle, and one threatened species, the Green Sea Turtle, may nest on several islands under U.S. Army Kwajalein Atoll control: Roi-Namur, Lagos, Ningi, Ennylabegan, Ennugarret, and Omeleck. Both species have been observed off the southwestern end of Kwajalein Island (35, 41, 68, 88).

Operations at the U.S. Army Kwajalein Atoll were evaluated by the U.S. Army in "Environmental Impact Assessment of Kwajalein Missile Range Operations, Kwajalein Atoll, Marshall Islands, Revision No. 1," dated August 1980 (88). That document concluded that range operations:

- Had not resulted in significant adverse, direct effects on the physical or human environment at that time

TABLE 2-11
SELECTED ENVIRONMENTAL CHARACTERISTICS
U.S. ARMY KWAJALEIN ATOLL

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	Approximately 100 component islands in Kwajalein Atoll, total land area = 3,584 acres; Kwajalein Island = 768 acres, Roi-Namur = 419 acres, Meck Island = 55 acres; lagoon = 75 x 15 miles	41, 68, 88
		BASE FACILITIES	Marine terminal facilities, storage warehouses, power plants, underground power distribution system, 6,800 x 250 foot runway, air terminal, deepwater fuel pier, fuel farm, mechanical and electrical repair shops, administrative office space, barracks and dormitory, hospital, schools	68
		TEST FACILITIES	Tracking radar, optical instrumentation, telemetry facilities, multiple launch facilities	68
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	Coconut harvest and operation of fisheries. Mineral deposits of limited quantity within the Marshall Islands, but non-existent on Kwajalein Atoll.	41, 43
		VISUAL RESOURCES	Most of the islands are elongated in shape, flat, and rise no more than 15 feet above sea level. Original surface features of Meck Island have been completely altered.	88, 90
		SPECIAL STATUS	One endangered species, the Hawksbill Turtle and one threatened species, the Green Sea Turtle, may nest on the following islands under U.S. Army control or partial control: Roi-Namur, Legos, Ningi, Ennylabegan, Ennugarret, and Omelek. Turtles have been observed at southwestern end of Kwajalein Island, feeding off food-wastes dumped daily into oceans. No forest preserves established; existing parks and sanctuaries either privately owned or operated by the local state authorities. The entire islands of Kwajalein and Roi-Namur are listed as historical battlefields on the National Register. All actions (i.e., construction) must conform to Army Regulation 420-40, which considers the National Historical Preservation Act.	34, 41, 68, 90
		NOISE	No data available on noise levels for U.S. Army Kwajalein Atoll activities	
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	There are approximately 2,600 total non-indigenous persons residing at U.S. Army Kwajalein Atoll facilities (2,350 on Kwajalein Island and 250 on Roi-Namur).	88, 89, 97
		PAYROLL	Data not available	
		HOUSING	519 Family Housing Units (Permanent & Trailer); 1,202 Barracks & Dormitory Beds; 150 Transient (1984; note that additional housing construction is currently underway)	88, 89

TABLE 2-11 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
U.S. ARMY KWAJALEIN ATOLL

				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURE	ELECTRICITY	Electricity on Kwajalein supplied by diesel generators; Peak load: Kwajalein = 9960 kW; Ennylabegan = 350 kW; Roi-Namur = 5300 kW. Capacity: Kwajalein = 5.2 million kWh; Ennylabegan = 217,000 kWh; Roi-Namur = 2.7 million kWh; Meck 795 kW.	88, 89
		SOLID WASTE	Metal wastes transported by barge to authorized dumping site 21 miles west of the Kwajalein Atoll. Other wastes incinerated within EPA standards or placed in sanitary landfills. Wet waste dumped into ocean off Kwajalein Island. Past problem with seepage from landfill into the shorewaters.	33, 35, 88, 96
		SEWAGE TREATMENT	Sewage treatment plant on Kwajalein Island is designed to treat an average design flow of 0.45 mg/liter and remove 85% to 90% of suspended solid and 75% to 85% biochemical oxygen demand. After 90% of solids are removed, the total effluent is 450,000 gallons/day. Roi Namur has five pumping stations served by a septic tank and a leach field on the island's east side. No sewage treatment facilities exist on the west side of Roi-Namur. Untreated sewage is currently collected from the bachelor's quarters and dining facilities and pumped via a 12-inch main directly into the Kwajalein Atoll Lagoon. Residents are restricted from using these areas for health concerns and there is a potential for contamination of the island's freshwater supply.	88, 89, 97
		TRANSPORTATION	Sea transportation network provides inter-island movement of cargo and passengers, and logistical support from the major governmental centers to all inhabited outer islands. On Kwajalein Island, there are 13 miles of paved road, 300 vehicles; no vehicular congestion. Workers from Ebeye are brought over by ferry. Air transportation available on Kwajalein Island.	36, 41, 68, 89
PERMIT STATUS		WATER SUPPLY	Inhabited islands have rainwater catchment systems, none of which supplies enough potable water for the area's needs. Salt water is used in sewers and for fire fighting. Underground lenses of fresh water can provide in excess of 50 million gallons per year on Kwajalein Island, and 8 million gallons per year on Roi-Namur. Groundwater resources on other islands unknown. Water consumption from all sources on Kwajalein Island = 272,580 gallons/day, Roi-Namur = 25,309 gallons/day, Ennylabegan = 2,629 gallons/day. Portable desalination units are being brought to the U.S. Army Kwajalein Atoll to cover needs until desalination plant is built on Kwajalein in FY 1991. Droughts in recent years have resulted in inadequate water supply for the existing populations on Kwajalein and Roi Namur Islands. In emergency situations, water from Kwajalein Island is barged to Roi-Namur.	36, 88, 89, 97
		AIR	Air pollution currently not a problem due to the constant tradewinds, the island's low profile, and lack of constraining factors. Air pollutants are generated from transportation, range operations, power plant generators, dust, and waste incineration. Power plant generators are the major source for particulates, sulphur, oxides, and nitrogen oxides. 1979 estimates of power plant emissions showed emissions approaching the limits of EPA standards for nitrogen oxide.	35, 41, 88

TABLE 2-11 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
U.S. ARMY KWAJALEIN ATOLL

			REFERENCE NO.
PERMIT STATUS (Continued)	WASTE WATER	Water quality standards may be violated as a result of toxic metal leaching from a solid waste disposal site used by U.S. Army Kwajalein Atoll operations.	33, 34, 88
	HAZARDOUS WASTE	Known hazardous wastes on Kwajalein: PCBs, solvents, asbestos, hydrazine fuel. When hydrazine fuel is used, someone is brought in specifically to handle the associated problems; no known violations; has a hazardous waste management plan implemented to comply with Army Regulation 420-47. All toxic metals are returned to the United States for disposal.	34, 35, 97
ADDITIONAL ENVIRONMENTAL INFORMATION		EIA, Internal Operations, 1974; EIA, Kwajalein Missile Range Operations, 1980; EA, Family Housing Dwellings, 1986; EA, Missile Impacts, Illegini Island, 1977 Environmental Consideration, ERIS, Meck Island, 1986; Environmental Consideration, HEDI, Meck Island, 1986; Environmental Consideration, AOA, 1985; Environmental 124 Consideration, TIR, 1987; EA Power Plant upgrade, Kwajalein Island, 1987	5, 22, 37, 38, 88, 90, 91
COMMENTS		- U.S. operations on the Kwajalein Atoll must comply with all NEPA standards. However, there is no formal permitting procedure or monitoring. It is the responsibility of the user agency to make sure standards are met. - Any reentry debris from Western Test Range activities that land in the Kwajalein Lagoon are required to be removed in compliance with the "clean bottom" policy.	34, 35 4

TABLE 2-12.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
U.S. ARMY KWAJALEIN ATOLL (EBEYE)

POPULATION

Total Persons		Density per sq. mi. (Area = 76 acres)
1967:	3,540	29,810
1973:	5,469	46,055
1980:	6,169	51,949
1985:	7,875	66,316

(For comparison, population density in Washington D.C. is about 12,000 persons per sq. mi.)

Percent of Marshallese residents on Ebeye born on Ebeye, 1973 = 48%

Median Age

1967: 16 years
1973: 15 years
1980: 14 years

HOUSING

Total Units		Median Persons Per Household	
1967:	308	1967:	7
1980:	602	1980:	9

Vacancy Rate

1980: 1.6%

EMPLOYMENT

1982: 996 employed full time
62% USAKA
28% RMI public service
10% Local economy
(sales of goods to population)

References: 42, 61, 65, 68, 74

- o Had created significant direct, short-term social and economic benefits
- o Had resulted in long-term cumulative constraints to future uses of the islands by the native Marshallese
- o Had resulted in controversial, long-term, indirect effects on Marshallese society.

Construction of new housing units for the families of United States personnel working on Strategic Defense Initiative programs has been addressed in a 1986 U.S. Army study, "Environmental Assessment for Family Housing Dwellings, FY 1987-1989 Phases, Kwajalein Island" (91). Construction of launch facilities on Meck Island has been addressed in two record of environmental consideration documents prepared by the U.S. Army in December 1986 (5). Construction and operation of a power plant expansion on Kwajalein Island has been addressed in "Environmental Assessment for Upgrade of Power Plant No. 1, Kwajalein Island, Marshall Islands, May 1986" (22).

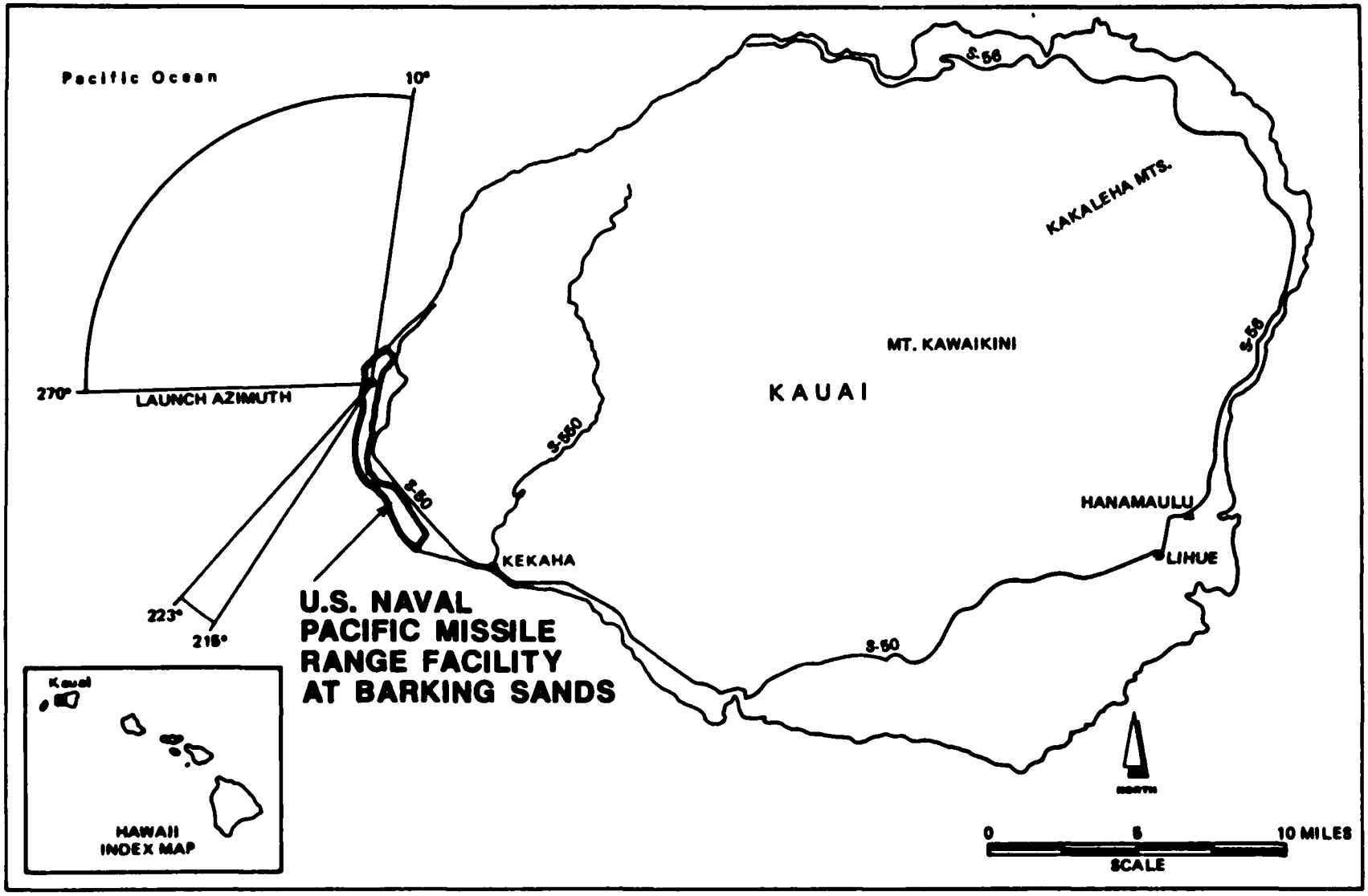
2.7 U.S. NAVAL PACIFIC MISSILE RANGE FACILITY AT BARKING SANDS

The U.S. Naval Pacific Missile Range Facility at Barking Sands is located on the west side of the island of Kauai, Hawaii (Figure 2-8). Barking Sands is a long, narrow site bordered on the west by the Pacific Ocean and on all other sides by agricultural and undeveloped land (92). The Pacific Missile Range Facility contains both land- and water-based facilities in support of U.S. Navy test programs (92). In addition, there are three separate launch facilities used to launch test flights of tactical missiles and other projectiles. A description of this facility and its environment is presented in Table 2-13.

The Kauai Test Facility is a Department of Energy rocket launch facility operated by Sandia, located in the northern part of the Barking Sands facility. It is currently being upgraded to accommodate the launching of intermediate-range booster missiles (71). A missile launch pad, a vertical access tower, an auxiliary equipment building, access roadways, and supporting utility systems are being added to the facility (71).

For socioeconomic purposes, the supporting region for this facility is defined as the island of Kauai. Table 2-14 contains relevant socioeconomic data for this area.

Based on available data, the Pacific Missile Range Facility is in compliance with Federal standards for air quality, water quality, and hazardous waste (46). Environmental documentation has been prepared for the Kauai Test Facility at Barking Sands (Preliminary Environmental Assessment, Kauai Test Facility, U.S. Naval Pacific Missile Range Facility) (71).



LOCATION MAP OF U.S. NAVAL PACIFIC MISSILE RANGE FACILITY AT BARKING SANDS, KAUAI, HAWAII

FIGURE 2-8

TABLE 2-13
SELECTED ENVIRONMENTAL CHARACTERISTICS
U.S. NAVAL PACIFIC MISSILE RANGE FACILITY, BARKING SANDS

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	584 acres, 200 yards wide, 7 miles long	47
		BASE FACILITIES	361 total structures; 222 habitable buildings; two Navy-maintained 6,000 x 150 foot runways; fuel farm; telephone vault; missile assembly building; WWVH transmitter facility; recreation center	47, 71
		TEST FACILITIES	Kauai test launch facility (Sandia) - MACH II and MACH III missiles (undergoing upgrade); PMRF launch facility (NAVY) - BQ and MQM missile types; Kokole Point Launch Facility	47, 71
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	Agriculture (sugar cane), beach front (shoreline), conservation lands (existing forest and water reserve zones), large apiary	71
		VISUAL RESOURCES	Located on the seaward margin of the Broad Mana Coastal Plain of Kauai; characterized by open areas, sand dunes, and filled-in wetland planted with sugar cane; lies within the rainshadow of Mount Kawaikini and Waialeale.	71
		SPECIAL STATUS	Threatened and endangered species include the Hawaiian Hoary Bat, American Coot, Common Moorhen, Black-necked Stilt, and possibly Hawaiian Duck. All are common to irrigation ditches and wetlands. Public beach recreational facility (40 feet back from shoreline); small graveyard with remains of past inhabitants of Mana Village. Several unregistered archaeological and historic sites located within base boundaries, none in area of Kauai Test Facility.	71, 92
		NOISE	Within standards of air installation compatible-use zone; noise from IRBM firings will be similar to that from present firings.	46, 71, 93
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	Civilian = 100 Military = 130 Contractor = 600	47
		PAYROLL	Data not available	
		HOUSING	Housing available on facility.	47

TABLE 2-13 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
U.S. NAVAL PACIFIC MISSILE RANGE FACILITY, BARKING SANDS

				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Peak daily demand = 1,350 kWh; peak daily capacity = 2,100 kWh; service supplied by Kauai Electric Company	46, 92
		SOLID WASTE	Domestic refuse from military activity approximately 182 tons/year; disposed of in offsite landfill operated by the County of Kauai	46, 92, 93
		SEWAGE TREATMENT	Design capacity = 90,000 gallons/day, includes leach fields, septic tanks, two treatment plants, leach ponds Current use = 43,000 gallons/day	46
		TRANS-PORTATION	Highway 50 is access to facility; one road on base narrows to one lane, currently being upgraded; Navy maintains two runways	46, 93
		WATER SUPPLY	Daily demand = 300,000 gallons/day; Daily capacity = 500,000 gallons/day; service supplied by Kauai Board of Water Supply, Kaehaha Sugar Company, and the State of Hawaii; water chlorinated before use.	46, 92
PERMIT STATUS		AIR	In attainment area; no PSD permits; however, use of hydrazine-nitracine motor for IRBM could present handling, storage, and transportation problem	46, 93
		WASTE WATER	No NPDES permits for facility	46
		HAZARDOUS WASTE	RCRA Part B - Interim status; have treatment and storage but no disposal with regard to OTTO fuel waste	46
ADDITIONAL ENVIRONMENTAL INFORMATION			No overall environmental compliance plan available; existing Pacific Missile Range Facility Base Master Plan, Sept. 4, 1986; Preliminary EA, Kauai Test Facility, U.S. Naval Pacific Missile Range Facility, 1986	71, 93
COMMENTS			-- Quantity Distance Arc extends beyond base boundary onto state land; land use is "non-conflicting" agricultural; base currently negotiating with state to lease land to cover quantity distance arc problem.	49
			-- Base has cleared public beach for past 25 years before and during firings; base currently negotiating with Army Corps of Engineers to extend jurisdiction to surf zone to make clearings legal.	49

TABLE 2-14.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
PACIFIC MISSILE RANGE FACILITY AT BARKING SANDS

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
Kauai					
Population	29,761	39,082	43,980	2.76	3.00
Year-Round Housing	8,973	14,544	N/A	4.95	N/A
Vacancy Rate (%)	7.7	17.1	N/A	--	--
Civilian Labor Force	12,447	18,789	21,849	4.2	3.84
Unemployment (%)	3.7	3.0	6.8	--	--
Per Capita Income [1]	2,830	7,022	8,658	--	--
Median Family Income [1]	9,945	20,882	N/A	--	--

References: 62, 63, 64, 66, 73

[1] Income figures refer to preceding year

3. ENVIRONMENTAL CONSEQUENCES

This section assesses the potential environmental consequences of the proposed ERIS tests. It is based on a comparison of the tests described in Section 1 with the facilities to be utilized at proposed test locations, as described in Section 2. Any identified environmental documentation that addresses the types of activities proposed for the facilities is incorporated by reference.

Many of the tests for the ERIS Demonstration/Validation program would be conducted at a contractor facility, specifically Lockheed Missiles and Space Company. The contractor has been selected through the DoD procurement process and is required to meet all Federal, State, and local environmental laws and regulations necessary for facility operations.

The approach used to complete the Environmental Assessment of the ERIS Demonstration/Validation program was described in Section 1. To assess the potential for and the magnitude of impacts from Demonstration/Validation at each government facility, a two-step methodology was utilized (Figure 3-1). The first step was the application of assessment criteria to identify activities with no potential for significant environmental consequences. Activities were deemed to present no potential for significant environmental consequences if they met all of the following criteria (i.e., all "yes" answers):

1. Are the facility and its infrastructure adequate for the proposed activity (i.e., can the tests be conducted without new construction, excluding minor modifications)?

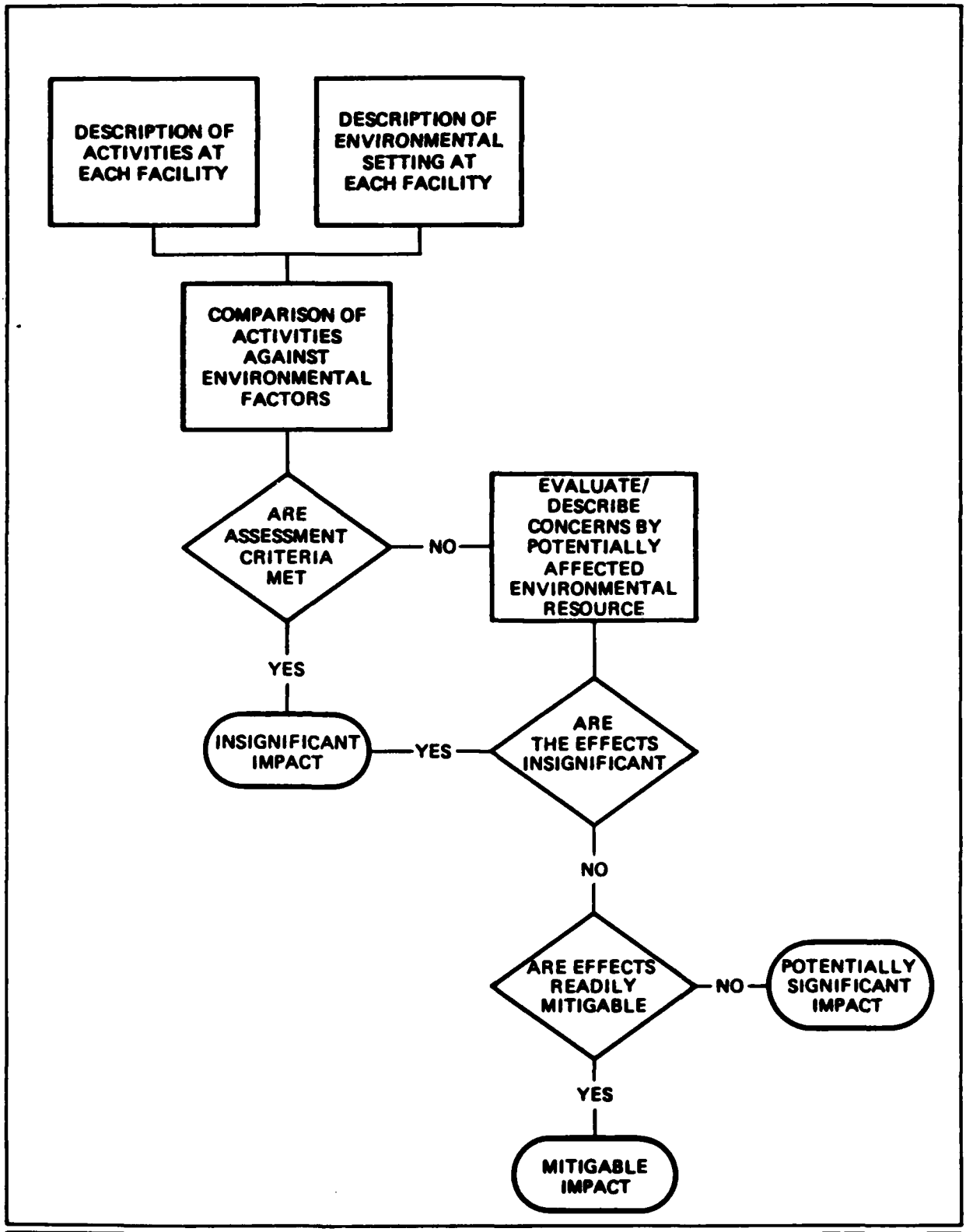
2. Is current staffing at the facility adequate to conduct the test, excluding minor staff level adjustments?

3. Does the facility comply with existing environmental standards?

4. Are the resources of the surrounding community adequate to accommodate the proposed testing?

If a proposed test was determined to present a potential for impact (i.e., a "no" answer to any of the above questions), the second step was to evaluate the activity in the context of the following environmental considerations: air quality, water quality, biological resources, infrastructure, hazardous waste, land use, visual resources, cultural resources, noise, and socioeconomics. As a result of that evaluation, consequences were assigned to one of three categories: insignificant, mitigable, or potentially significant.

Environmental consequences were determined to be **insignificant** if, in the judgment of the analysts or as concluded in existing environmental documentation, no potential for significant environmental impacts exists. Consequences were deemed **mitigable** if concerns exist but it was determined that all potential consequences could be readily mitigated through standard procedures, or by measures recommended in existing environmental documentation. If serious consequences exist that could not be readily mitigated, the activity was determined to represent **potentially significant** environmental impacts.



METHOD FOR ASSESSING
POTENTIAL ENVIRONMENTAL CONSEQUENCES

FIGURE 3-1

The remainder of this section provides discussions of the potential environmental consequences for each location proposed for the ERIS Demonstration/Validation program. The impacts of the no-action alternative and irreversible and irretrievable commitments of resources that would accompany ERIS Demonstration/Validation are described at the end of this section.

3.1 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

3.1.1 Arnold Engineering Development Center

The ERIS tests to be conducted at Arnold Engineering Development Center would use several wind tunnels to test the guidance and control system. The wind tunnels are used regularly and this type of testing is considered routine. The specific wind tunnels used to test the ERIS have not been identified, but it is anticipated that the tunnels chosen would be adequate for the proposed testing and would not require significant modification. At present, most of the 3,700 contractor staff are dedicated to wind tunnel testing or maintenance of the tunnels (17); no additional staff will be required, no socioeconomic impacts are expected, and the facility is in compliance with environmental standards.

Environmental consequences associated with testing activities at Arnold Engineering Development Center are being addressed in a formal environmental assessment that is undergoing revision (8). Based on the presence of adequate facilities and staff and compliance with environmental standards, the environmental consequences of testing for ERIS are anticipated to be insignificant.

3.1.2 National Test Facility

The National Test Facility would be used for analysis and application of data from flight tests of the ERIS in simulation exercises. The functions of the National Test Facility in the ERIS tests are within the scope of its design. Environmental effects of construction and operation of the National Test Facility are presented in the "National Test Facility Environmental Assessment" (78). This environmental assessment estimated that minor erosion during construction and minor impacts on air quality, ecology, groundwater supply, and vehicular traffic during operation would occur. It concluded that with the implementation of proposed mitigation measures, no significant impacts are anticipated. Copies of this environmental assessment may be obtained from the Public Affairs Office at Falcon Air Force Station.

Until the National Test Facility is constructed, the staff necessary to complete the ERIS tests would be located at existing facilities at Falcon Air Force Station. The environmental consequences of the proposed use of these existing facilities were addressed in a "Request for Environmental Impact Analysis," control number AFSPC 86-1 (85). The result of this request was an assessment that the interim National Test Facility qualified as a categorical exclusion in accordance with U.S. Air Force Categorical Exclusion 2x. This categorical exclusion states, "This is an administrative action utilizing interior space for personnel and computer equipment." Thus, no further environmental documentation is necessary. The categorical exclusion refers to the environmental impact statement for the Consolidated Space Operations

Center (80). Copies of this document may be obtained from the Public Affairs Office at Falcon Air Force Station.

Operation of the National Test Facility would require a significant increase in the staff at Falcon Air Force Station. The previously completed "National Test Facility Environmental Assessment" (78) predicted the creation of approximately 2,300 permanent onsite jobs, as well as a daily average of 400 visitors (because each visit is likely to last several days, visitors were counted as equivalent to employees). Including the visitors, the total maximum daily population would thus be increased by 2,700. On the assumption that only 10 percent of the daily population would be drawn from the local area, it was predicted that more than 2,400 families would relocate to the area. No estimates of the portion of the staffing specific to ERIS have been made. While it can be assumed that only a portion of the total staffing is relevant to ERIS, the consequences of complete staffing are included as a worst-case analysis.

Applying the four assessment criteria against the test activities and the facility construction they would require shows the potential for environmental effects related to the construction and operation of the National Test Facility, the proposed staffing requirements of the facility, and the resulting socioeconomic presence in surrounding communities. The assessment criteria for compliance with permits is met by the existing facilities. The results of the environmental assessment conducted for the National Test Facility are summarized below.

Air Quality

Current operations at Falcon Air Force Station are in attainment by Colorado standards. Once the National Test Facility is constructed, operations, are predicted to add to an existing violation of the 1-hour and 8-hour carbon monoxide Federal standard from automobiles at the intersection of Petersen Boulevard and Highway 94 outside the base (78). This addition can be mitigated through the use of van pools and other conservation measures.

Water Quality

All discharges are in compliance with current permits (11). The environmental assessment for the National Test Facility predicts no significant impact on groundwater or surface water quality (78).

Biological Resources

No threatened or endangered species are identified in the vicinity of the National Test Facility (78). Impacts to biological resources were predicted to be insignificant (78).

Infrastructure

Evaluation of the effects on each of the infrastructure components is as follows:

- The electrical substation can be expanded to 25,000 kW with additional cooling equipment. The National Test Facility will

require the addition of 13,000 kW, which could be accommodated by expansion of the substation (78).

- Solid waste is disposed of offsite in a licensed landfill. The amount of solid waste that would be generated by the National Test Facility has not been estimated, but it is anticipated to be a relatively small volume (11).

- Sewage treatment capacity is currently adequate but the construction of the National Test Facility requires an expansion of the capacity of the sewage treatment plant by 0.124 million gallons/day (78). The expansion could encroach on a flood plain. All impacts are anticipated to be mitigable (78).

- Construction and operation of the National Test Facility are projected to increase water requirements from 0.37 million gallons/day to 1.0 million gallons/day (78). Mitigation measures such as conservation, reuse, and drought-tolerant landscaping would reduce the projected water requirements to 0.5 million gallons/day (78). Additional mitigation measures would have to be implemented to prevent exceeding water supply.

- Transportation system capacity exceeds current traffic demands. The addition of the National Test Facility would create significant increases in vehicular traffic, but would be below design capacity; however, increased delays would occur at some intersections (78).

Hazardous Waste

Any hazardous waste would be disposed of in accordance with current applicable regulations (11, 13).

Land Use

There are no current land use or zoning conflicts (12). No conflicts are anticipated for the development and operation of the National Test Facility (78). Expansion of the sewage treatment plant could encroach on a flood plain. This impact can be mitigated through the use of standard flood control measures.

Visual Resources

The current visual landscape is a rolling agricultural grassland (78). The National Test Facility will have an insignificant additional impact on the visual resources because it will be adjacent to an existing building (78).

Cultural Resources

No cultural resources have been identified at the facility (78); therefore, impacts are anticipated to be insignificant.

Noise

Due to the administrative and industrial nature of the existing facilities on Falcon Air Force Station, impacts from construction and operation are anticipated to be insignificant (78).

Socioeconomics

Unemployment in El Paso County of 5.4 percent (8,800 persons) in 1984, and an adequate availability of housing, indicate that the socioeconomic impacts of the growth resulting from construction and operation of the National Test Facility would be insignificant.

The environmental consequences associated with the construction and operation of the National Test Facility are mitigable by the measures described in the "National Test Facility Environmental Assessment" (78). No significant environmental consequences have been identified associated with the operation of the Interim National Test Facility based on the "Request for Environmental Impact Analysis" (control number AFSPC 86-1) (85).

3.1.3 Nevada Test Site

Demonstration/Validation activities for ERIS at the Nevada Test Site would include the exposure of components and assemblies to a nuclear environment. The dedicated use of the Nevada Test Site includes such activities (18) and testing for ERIS would take advantage of underground nuclear tests scheduled for other programs. No facility modifications are anticipated and no additional staff or infrastructure services would be necessary as a consequence of ERIS activities. Also, the Nevada Test Site meets all applicable environmental standards (99, 100). Therefore, the environmental consequences of the ERIS activities at the Nevada Test Site are expected to be insignificant.

3.1.4 Harry Diamond Laboratories

Adelphi, Maryland

Demonstration/Validation test activities for ERIS in the Aurora Facility at Harry Diamond Laboratories, Adelphi, Maryland, would involve testing hardened circuitry exposed to gamma radiation. The radiation chamber is used regularly on a year-round schedule. Tests are conducted three times per day, using the regular staff (2).

Due to priority status of the Strategic Defense Initiative program, previously scheduled tests would be rescheduled to accommodate testing of ERIS (1). Therefore, testing of ERIS components would not represent an increase in the number of tests run per year at the Aurora Facility. Testing for the Strategic Defense Initiative program would require minor staff level adjustments (1). However, the increase is insignificant in the context of the over 1,800 staff at the Adelphi site.

Applying the four assessment criteria against the test activities and their associated facilities shows no potential for environmental effects related to testing of ERIS. This conclusion is based on the presence of adequate facilities, insignificant staff increases, compliance with environmental standards, and adequate resources in the surrounding community.

Environmental consequences associated with ERIS Demonstration/Validation activities at the Aurora Facility, Harry Diamond Laboratories, Adelphi site are expected to be insignificant.

Woodbridge, Virginia

Environmental impacts at Harry Diamond Laboratories Woodbridge Research Facility, in Woodbridge, Virginia beyond those that result from normal operations would not be expected from ERIS testing. The electromagnetic pulse test facility is utilized on a regular basis and involves all the permanent staff (45).

Due to the priority status of the Strategic Defense Initiative program, previously scheduled tests would be rescheduled to accommodate testing of the ERIS. Therefore, testing of ERIS components would not represent an increase in the number of tests run per year at the Woodbridge Research Facility, no staff increases would be anticipated, and adequate resources are available in the surrounding community.

The Woodbridge Research Facility is in compliance with environmental standards (24). Electromagnetic pulse test facilities are the subject of a civil action for failure to provide adequate and required National Environmental Policy Act environmental documentation on their electromagnetic pulse program (94). The staff at Harry Diamond Laboratories are currently in the process of preparing the required site-specific environmental documentation (30). Although testing associated with the ERIS program would not significantly increase the regularly scheduled electromagnetic pulse testing at the Woodbridge Research Facility, mitigations, if any, cited in the environmental documentation in preparation must be adhered to in all electromagnetic pulse testing.

3.1.5 Vandenberg Air Force Base/Western Test Range

The ERIS flight test program would involve four to seven launches of Minuteman I missiles from Vandenberg Air Force Base between 1991 and 1992. The first four of these launches are already in the normal schedule for the year in which they would be launched. An additional three target launches would be from Vandenberg Air Force Base if the facility schedule permits. Regularly scheduled launches of Minuteman missiles require no new construction or additions to staff. The launches are a continuation of activities that are within the operational limits of Vandenberg Air Force Base. Minuteman tests and operations are similar to those conducted for MX Missile Development (53). A final environmental impact statement was prepared for the MX Missile Milestone II Decision (81). Copies of this documentation are available from the Public Affairs Office at Vandenberg Air Force Base.

ERIS would involve launches of targets from Vandenberg Air Force Base, which in turn would require activating the Western Test Range for each launch. The Western Test Range is activated 60 to 70 times per year. ERIS launches would not significantly affect range operations since they represent a relatively small increase in the number of times the range would be activated.

The results of applying the four assessment criteria against the test activities indicate potential environmental impacts on the facility infrastructure,

specifically water supply. The Western Test Range meets all four assessment criteria, therefore environmental consequences are considered insignificant. A more detailed assessment addressing each of the environmental considerations at Vandenberg Air Force Base was completed and is presented below.

Air Quality

Vandenberg Air Force Base is currently in attainment for all National Ambient Air Quality Standards. Air quality is monitored at three stations onbase (57). Minuteman missile launches are clean burning with no acid deposition. Any emissions are dispersed immediately over the ocean, and therefore do not contribute to onbase air quality degradation (53). Any degradation of air quality can be attributed to transporting vehicles, but these effects are not significant for the current Minuteman launch schedule (53).

Water Quality

There are currently National Pollution Discharge Elimination System permits in place for 15 onbase sewage discharge locations (51). Water used in launch washdown operations is either collected, stored, and disposed as hazardous waste, or treated by the onbase sewage facilities (53). Continued Minuteman launch operations within the current schedule are not expected to affect water quality.

Biological Resources

Seven federally listed threatened and endangered species are present on Vandenberg Air Force Base (77). A critical habitat for one of the endangered species is located near the Peacekeeper launch area, but launches of Minuteman missiles would not affect this area (77). The threatened and endangered species are subjected to vibration from launches and could be affected by catastrophic explosions (53). Vibration impacts are not considered significant and possible catastrophic explosions are unlikely; thus, impacts of Minuteman launch operations within the current schedule are expected to be insignificant.

Infrastructure

Evaluation of the effects on each of the infrastructure components is as follows:

- Electricity is currently supplied by the Pacific Gas and Electric Company power grid (53). Demand is below capacity and continued Minuteman launches within the current schedule will not increase electrical demand (21).
- Solid waste is disposed offbase at five facilities with adequate capacity. Continued Minuteman launches within the current schedule will not increase solid waste volume (21, 77).
- Sewage treatment by onbase and offbase facilities are within capacity. Continued Minuteman launches within the current schedule will not increase sewage volumes.

- Water is supplied by 10 onbase wells (77). Currently water use in the region is overdraving the two aquifers used for water supply. Although the continued Minuteman launches within the current schedule will not increase water consumption, overall operations of Vandenberg Air Force Base are contributing to overdrawing the aquifers, and at current usage rates the aquifers could be depleted (77). The Draft Environmental Impact Statement, Mineral Resources Management Plan, states that concerted efforts to plan and enforce water management programs can prevent serious impacts to water supply (77).

- Transportation routes to the base are at or near capacity (77). Routes on base have excess capacity (77). Additionally, access routes to launch sites are restricted several hours before a launch (53). Continued Minuteman launches within the current schedule will not affect the transportation network.

Hazardous Waste

Vandenberg Air Force Base has a short-term hazardous waste storage permit. Disposal is offbase by a licensed contractor (40). Continued Minuteman launches within the current schedule would not contribute increased volume or new types of hazardous waste.

Land Use

Launch facilities for Minuteman missiles are adequate for the current schedule, and are consistent with land use guidelines outlined in the "Base Development Pattern" (83).

Visual Resources

Continued launching of Minuteman missiles from existing facilities would not affect present visual resources.

Cultural Resources

There are 600 known cultural resources, mostly archaeological sites, on Vandenberg Air Force Base (77). Two sites are on the National Register of Historical Places, but are not in areas adjacent to existing Minuteman launch facilities (77). The continued use of existing facilities would not affect the cultural resources.

Noise

There are no specific standards for noise levels, but noise generated by Minuteman launches is of short duration and high intensity within a remote area (53). Continued Minuteman launches will not contribute excessive noise.

Socioeconomics

No new staff will be required for continued Minuteman launches within the current schedule, and therefore no socioeconomic impacts are expected (56).

As a result of the analysis of each of the environmental considerations, no potential significant impacts have been identified that are related to Minuteman launches. Thus, ERIS impacts at Vandenberg Air Force Base are anticipated to be insignificant.

3.1.6 U.S. Army Kwajalein Atoll

Flight testing of ERIS would be performed at U.S. Army Kwajalein Atoll. This use of U.S. Army Kwajalein Atoll facilities is consistent with the current missions and operations of those facilities. However, upgrading existing facilities and constructing new facilities would be necessary at Meck and Kwajalein Islands.

On Meck Island, a general refurbishment of infrastructure would be completed (5). An existing missile assembly building, silo, and launch equipment rooms would be upgraded to accommodate the ERIS flight test.

The potential consequences of refurbishment and construction of launch facilities on Meck Island have been addressed in separate environmental analyses. The U.S. Army Corps of Engineers, Pacific Ocean Division, has prepared a record of environmental consideration for the upgrade of the existing missile assembly building, silo, launch equipment room, and infrastructure (5). The result of the record of environmental consideration was Categorical Exclusion #7, as defined in Appendix A to Army Regulation 200-2 (5). This exclusion applies to "construction that does not significantly alter land use, provided the operation of the project when completed would not of itself have a significant environmental impact." Projects that fall into this category do not require additional environmental documentation. Copies of the record of environmental consideration are available from the Public Affairs Office, U.S. Army Strategic Defense Command, Huntsville, Alabama.

Additional support personnel would primarily be housed at Kwajalein Island, which in turn will require support services and new housing. Current estimates call for an increase in facility population (staff and their dependents) of approximately 285 persons (11.7 percent) beyond the most recent available population figures for the U.S. Army Kwajalein Atoll (2,432 persons on 30 June 1986) (31, 89). The total population would be below the highest population figure of nearly 6,000 people in 1972 (68).

Housing requirements associated with ERIS flight testing were estimated to include 37 permanent family houses, 100 bachelor quarters, and 20 transient quarters on Kwajalein Island (25). The environmental consequences of housing construction on the island of Kwajalein to support the ERIS program have been analyzed in "Environmental Assessment for Family Housing Dwellings, FY 1987-1989 Phases," prepared by the U.S. Army Strategic Defense Command in 1986 (91). That study, which included evaluations of housing needs to support all Strategic Defense Initiative programs planned or proposed for U.S. Army Kwajalein Atoll, concluded that the proposed construction does not constitute a major Federal action having a significant effect on the quality of the human environment. Copies of the aforementioned Environmental Assessment for Family Housing may be obtained from the Public Affairs Office of the U.S. Army Strategic Defense Command in Huntsville, Alabama.

In addition to new housing, the following construction on Kwajalein Island is planned: expansion of an existing power plant and a new desalinization facility. An environmental assessment was prepared on the construction and operation of the proposed power plant expansion, "Environmental Assessment for Upgrade of Power Plant No. 1, Kwajalein Island, Marshall Islands, May, 1986" (97). That environmental assessment concluded that the proposed action will not constitute a major Federal action with potential for significant impact on the environment. Copies of this documentation are available at the Public Affairs Office listed above.

Approximately 4 miles north of Kwajalein Island lies Ebeye Island, the main concentration of Marshallese in Kwajalein Atoll, and for assessment purposes it is defined as the "surrounding community" for the military facility. Ebeye Island has the second-highest population of any island in the Republic of the Marshall Islands, approximately 8,000 people (a density of 66,316 people per square mile), many having migrated there from other islands in search of jobs at the U.S. Army Kwajalein Atoll installation. As a means of reducing population density, a causeway connecting Ebeye Island with adjacent habitable islands is planned (43). Until this anticipated redistribution of population occurs, the dense population of Ebeye will continue to place heavy demands upon both manmade and natural resources of the island.

The application of the assessment criteria indicates a potential for environmental consequences related to ERIS activities at the U.S. Army Kwajalein Atoll. There are proposed facility modifications, additional staff requirements, and a lack of resources in the surrounding community. Thus, a more detailed assessment addressing each of the environmental considerations was completed. The results of the assessment of each of the environmental considerations are presented below.

Air Quality

Currently the U.S. Army Kwajalein Atoll has good ambient air quality attributable to strong tradewinds (88). However, 1979 estimates of emissions, especially from the power plant on Kwajalein Island, showed emissions approaching the limits of Federal standards for nitrogen oxide (NOx) (34, 35). Increased staff would require increases in power-generating capacity. The expanded power plant would have to meet major stationary source performance standards or obtain a waiver from the Marshall Islands government (35). The environmental assessment prepared for the power plant expansion concluded that mitigation measures would be required (22). Possible mitigation measures include raising the stack height, increasing the velocity of the emissions to increase dispersion, using low-NOx engine design, combustion air cooling, fuel injection recharge, or engines designed to meet the Environmental Protection Agency's proposed New Source Performance Requirements (22). The proposed power plant expansion "can meet all National Ambient Air Quality standards as well as nitrogen oxide if low NOx combustion and/or enhanced dispersion techniques are employed to reduce ambient impact by 28 percent" (22). Thus, this air quality concern is considered mitigable.

Water Quality

Available data from 1976 indicated that water quality was being degraded as a result of toxic metals leaching from a solid waste disposal site on Kwajalein

Island used by U.S. Army Kwajalein Atoll operations (88). Subsequently, a wall was constructed. The 1980 "Environmental Impact Assessment of U.S. Army Kwajalein Atoll Operations" noted that although a wall was installed on the ocean side of the Kwajalein Island landfill, a visual inspection in 1978 indicated direct leachate seepage to the ocean was occurring (88). The source of the leachate was considered to be waste oil or sewage tank pumpage that was dumped on the landfill. The landfill is currently used only for disposal of construction waste, and Demonstration/Validation activities associated with ERIS are expected to continue this use. In addition, consequences on water quality from potential increased population on Ebeye Island have not been evaluated in previous documents. The composition of the leachate and the potential change in rate of seepage from the landfill as a result of disposal of construction wastes from activities in support of Demonstration/Validation are unknown. Without mitigating actions, impacts on water quality caused by ERIS activities are potentially significant. Continued presence of leachate seepage from the Kwajalein Island landfill and potential mitigations, if any, are not documented. These and other potential impacts on water quality will be addressed in an environmental impact statement to be prepared by the U.S. Army for continuing operations at Kwajalein Atoll prior to initiation of ERIS Demonstration/ Validation flight test activities.

Biological Resources

Concrete used in housing and other facility construction may employ coral dredged from surrounding reefs. The construction needed to support activities associated with ERIS testing could constitute an increase in the harvesting of coral from surrounding reefs, if coral is used as a construction material as in the past. Extensive reef harvesting could result in degradation of the marine habitat (88). Coral harvesting can be accomplished in a manner that will ensure that critical habitats of marine biota are not degraded. Additional data collection and analysis will be required to identify positive and negative impacts of this activity at U.S. Army Kwajalein Atoll through the environmental impact statement investigations.

Several islands of the U.S. Army Kwajalein Atoll have beaches suitable for nesting sites of the endangered Hawksbill Turtle and the threatened Green Sea Turtle. No beaches suitable for turtle nesting have been identified on Kwajalein or Meck Islands (88). Degradation of marine water quality as discussed in the previous section could adversely impact marine biota. Consequences on biological resources from potential increased population on Ebeye Island have not been addressed in previous documents. Those potential impacts on biological resources will be addressed in the aforementioned environmental impact statement.

Infrastructure

The increased staffing and project activities associated with ERIS Demonstration/Validation are expected to increase the infrastructure demands on Kwajalein Island. Specific areas of consideration include electricity, solid waste, sewage treatment, water supply, and transportation. The aforementioned environmental impact statement will address appropriate mitigations for impacts from increased infrastructure requirements.

- Electricity demands associated with the ERIS-related population increase on Kwajalein Island would require increased generating capacity. A concern is the control of nitrogen oxide emissions from the power plant, which is mitigable as discussed earlier. The planned expansion of the power plant (97) should meet any increased electricity demands.

- Solid waste is currently disposed of by (1) burning combustible material, (2) dumping wet (biodegradable) waste and metal waste in the ocean, and (3) landfilling (35, 88). Additional staff required for ERIS activities would increase the volume of solid waste, but this waste would be disposed of in onbase facilities with adequate capacity.

- Sewage treatment demands at the U.S. Army Kwajalein Atoll are expected to increase as a result of the increase in inhabitants that would accompany ERIS testing. Such an increase in sewage treatment demands at Kwajalein Island is not expected to exceed the plant's existing capacity.

- Potable water is a limited resource on the islands of the Kwajalein Atoll (91). Water supplies on Kwajalein Island come from rainwater catchment and storage systems and groundwater lenses, although much of the groundwater is brackish. It is possible that increased demand resulting from ERIS activities could increase withdrawal of groundwater. Overdraft of groundwater could potentially result in saltwater intrusion and long-term degradation of the available groundwater resources. Kwajalein is unique in that the command has total control over all lens wells and monitors the groundwater level. This complete control with feedback minimizes the possibility of overdrawing the groundwater. Before groundwater depletion were allowed to occur, water rationing would be implemented or alternate sources of water would be utilized, such as importation. The increased demands for potable water that would result from ERIS activities would be accommodated through the planned construction of a desalinization system on Kwajalein Island. These planned mitigation measures are projected to be adequate to ensure sufficient potable water without degrading groundwater resources.

- Transportation on Kwajalein Island is predominantly by means other than automobiles. In 1986 there were only 300 cars for 13 miles of paved road (89). Transportation of employees to Kwajalein and Meck Islands from Ebeye Island is by ferry (36, 68). Increases in the number of Marshallese employees may necessitate increases in ferry capacity.

Hazardous Waste

The U.S. Army Kwajalein Atoll is preparing a Hazardous Waste Management Plan to comply with Army Regulation 420-47 (35). An increase in U.S. Army Kwajalein Atoll operations for the ERIS program may increase the volume of hazardous waste produced. The treatment, storage and disposal of additional hazardous waste must be in compliance with the Hazardous Waste Management Plan.

Land Use

The islands that make up the U.S. Army Kwajalein Atoll are dedicated for use as a military installation. The use of this facility for launching missiles and monitoring flight tests is a continuation of an established land use. The long-term impacts on land use from continuing operations at the U.S. Army Kwajalein Atoll will be addressed in the aforementioned environmental impact statement.

Visual Resources

The presence of the U.S. Army on Kwajalein Atoll has significantly altered the visual resources of the islands by extensive development. The current visual resources would continue to be altered by the facility upgrades for ERIS activities. Those alterations are anticipated to have an insignificant impact on visual resources.

Cultural Resources

Kwajalein Island is one of the islands in the Atoll considered historically significant due to the activities which took place on the atoll during World War II. In addition, potential prehistoric sites have been discovered very recently on Kwajalein Island, some possibly as old as 2,000 years (35). As any excavation during construction activities has the potential for permanently destroying such cultural resources, those activities could have a potential impact. An archaeological survey would be conducted and appropriate mitigations developed during the environmental impact statement process.

Noise

No data are available on noise levels associated with U.S. Army Kwajalein Atoll operations. Based on the distance between launching facilities on Meck Island and the nearest community (more than 10 miles), no significant noise impacts are anticipated from launches at Meck Island.

Socioeconomics

The economy of Ebeye Island relies heavily upon the people residing at the U.S. Army Kwajalein Atoll. Because of this dependence, changes in overall facility population associated with ERIS Demonstration/Validation operations could potentially have significant beneficial and adverse socioeconomic consequences. An increase in facility population of approximately 12 percent over the course of 2 years, and an anticipated decrease in facility population of approximately 10 percent over the course of a third year are anticipated (31). The socioeconomic concerns associated with the aforementioned increase in U.S. Army Kwajalein Atoll population are:

- The direct positive impact on the economy of Ebeye Island in terms of increased employment. Although some growth in employment in response to the increased population at the U.S. Army Kwajalein Atoll would be expected, the amount remains to be determined. The increase in employment should be complemented by the Job Corps program recently implemented by the U.S. Army Kwajalein Atoll (97).

- o The long-term social and economic effects of prolonged reliance of the Marshallese on DoD activities and expenditures.

- o The possible attraction of more Marshallese from other islands to already densely-populated Ebeye Island in response to even a small increase in relatively high-paying jobs (guaranteed U.S. minimum wage). The potential negative impacts of such additional immigration would include:

  -- a further increase in the high Marshallese unemployment

  -- further pressure on housing and other infrastructure on Ebeye Island

  -- public health falling below already unsatisfactory levels

  -- disruption of the economic mechanisms, authority structure, and kin relationships which underlie the Marshallese sociocultural system, both on Ebeye and on the islands from which the immigrants originated

The U.S. Army Kwajalein Atoll currently has a policy limiting the number of Marshallese they employ which may minimize the amount of influx of people to Ebeye Island.

As a result of the analysis of each environmental consideration, potentially significant impacts were identified at the U.S. Army Kwajalein Atoll. In recognition of the need to avoid, minimize and mitigate any potential adverse impacts on the environment of the Kwajalein Atoll, the U.S. Army will prepare a comprehensive environmental impact statement addressing the continuing operations at the U.S. Army Kwajalein Atoll, which include the proposed Demonstration/Validation activities (98). The environmental impact statement will address the environmental concerns recognized in this Environmental Assessment and will identify appropriate mitigations.

3.1.7 U.S. Naval Pacific Missile Range Facility at Barking Sands

ERIS flight tests may require targets launched from the U.S. Naval Pacific Missile Range Facility at Barking Sands. Additional facilities would need to be constructed to launch these targets. These new facilities are a missile launch pad, a vertical access tower, an auxiliary equipment building, access roadways, and supporting utility systems.

Applying the four assessment criteria against the test activities and the facility construction they would require shows the potential for environmental effects related to the construction (71). Thus, a more detailed assessment addressing each of the environmental considerations was completed.

Adequate staffing for construction or operation to support the proposed tests does not currently exist. Construction of new facilities would require additional staff probably obtained from the local area. Launching of missiles from the new facility would require approximately 40 to 60 additional staff from the mainland (71). The third and fourth assessment criteria regarding compliance with environmental standards and adequacy of community resources are met.

A "Preliminary Environmental Assessment, Kauai Test Facility, Barking Sands, Kauai, Hawaii" (71) was prepared for the construction and operation of the Intermediate-Range Booster System Facilities. Copies of this documentation are available from the Public Affairs Office at the Pacific Missile Range Facility at Barking Sands.

The results of the environmental assessment conducted for the Kauai Test Facility at Barking Sands are summarized below.

Air Quality

The Pacific Missile Range Facility is in an attainment area and the facility has no Prevention of Significant Deterioration permitted emissions at the present time (46, 93). The proposed ERIS activities are expected to use missiles fired with solid fuel propellants which burn without noxious fumes and would not be expected to cause air quality problems. Hydrazine-nitrazine propellants may be used; their use would be subject to review relative to Army Safe Operating Procedures. Air quality impacts due to construction activities are readily mitigable with standard control measures.

Water Quality

The Pacific Missile Range Facility currently has no National Pollution Discharge Elimination System effluents (46) and proposed operational activities are not expected to result in new effluents. Construction impacts on surface water are readily mitigable with standard control measures. Groundwater would be affected by increased infiltration due to clearing the land but this effect is expected to be insignificant.

Biological Resources

Five threatened and endangered species may exist on the site in irrigation ditches and wetlands (71, 92). These habitats are at least 1/2 mile from new facilities and impacts on them are not likely. Potential construction impacts will be minimized by standard mitigation measures.

Infrastructure

- Peak daily electric demand is about 64 percent of capacity available from the Kauai Electric Company (46, 92). Anticipated usage of the modified facilities is not expected to exceed the available capacity.

- Solid waste is collected and disposed offbase by a contractor in a county facility (46, 92, 93). Proposed activities are not expected to exceed the contractor's capability and the county facility's capacity.

- Sewage disposal demand is about half of the capacity of the existing system (46). This system is expected to be adequate for the proposed action.

- Water demand is supplied from three sources and is less than the present capacity (46, 92); proposed activities are not expected to require more than the existing capacity.

- o Transportation to and from the base is via Highway 50, which is adequate; there is no traffic congestion. The onbase road network is being upgraded (46, 93). Proposed activities would not impact either access to the base or onbase transportation.

Hazardous Waste

The Pacific Missile Range Facility hazardous waste treatment and storage facilities are permitted under the interim status requirements of the Resource Conservation Recovery Act (46). There is no onbase hazardous waste disposal (46). Proposed activities may generate some additional hazardous waste but the quantity is expected to be insignificant.

Land Use

The Quantity Distance Arc for safe operation of the intermediate-range booster extends beyond the present boundary of the base (49). Negotiations are in progress with the State to ensure that the land use within this radial distance remains agricultural so that there would be no land use conflicts (49). A beach area is available for public use except during launches, when access to the beach is prohibited (49, 71). Impacts on land use are anticipated to be mitigable.

Visual Resources

The launch pad is to be constructed in a grassland area near other existing launch facilities (71). The addition of the proposed facilities is not anticipated to create a significant visual impact.

Cultural Resources

There are no known historic or archaeological resources at or near the proposed facilities; some cultural resources have been identified on the base (71, 92). No impacts on these resources are anticipated.

Noise

Noise levels from past missile firing activities have not resulted in significant effects (46, 71, 93). The noise associated with the intermediate-range booster launchings is predicted to be similar to that from previous launch activities.

Socioeconomics

Based upon available data on the population, civilian labor force, unemployment, housing, and income for the supporting region, as well as the emphasis of the Kauai economy upon tourism (with its frequent, short-term influxes of people), use of the Pacific Missile Range Facility for ERIS Demonstration/Validation operations is unlikely to have a significant socioeconomic impact. This conclusion assumes a total of three ERIS launches (44), and follows the existing documentation (71) in assuming that each missile firing requires that 40 to 60 people be brought from the mainland for a period of several weeks, with each spending an average of $150 per day while on Kauai. As suggested in

the aforementioned environmental assessment (71), the socioeconomic consequences of such activities in a small island setting would be noticeable, but not necessarily significant.

As a result of the analysis of each environmental consideration, no potentially significant impacts have been identified. Therefore, ERIS activities at the U.S. Naval Pacific Missile Range Facility at Barking Sands are anticipated to be either insignificant or mitigable.

3.2 ENVIRONMENTAL CONSEQUENCES OF NO ACTION

If the no-action alternative is selected, no additional environmental consequences are anticipated. Concept Exploration would continue at currently staffed facilities with no changes in operations.

3.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Development of the ERIS through the Demonstration/Validation stage would result in irreversible and irretrievable commitment of resources such as electronic components, various metallic and nonmetallic structural materials, fuel, and labor. This commitment of resources is not different from those necessary for many other aerospace research and development programs; it is similar to the activities that have been carried out in previous aerospace programs over the past several years.

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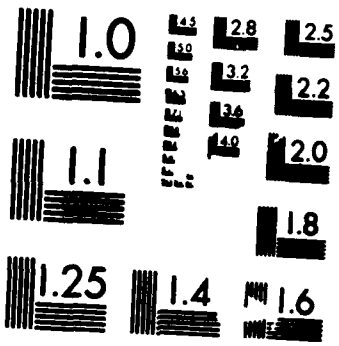

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APPENDIX A
TEST ACTIVITY DESCRIPTIONS

The Demonstration/Validation test activities have been divided into four categories: analyses, simulations, component/assembly testing, and flight tests. This Appendix describes in greater detail the simulations, component/assembly tests, and flight tests identified in Section 1.3.

SIMULATION TESTING

Simulation testing of a physical entity (machine, system component, etc.) is accomplished by developing a computer model of that entity. The model then interacts with data representing physical stimuli to assess the entity's capabilities in real-world conditions. A simulation involves writing and running computer programs, with possible interfaces to other systems or system elements. No impacts on the physical environment are involved other than the commitment of manpower and electrical energy involved in computer operations.

COMPONENT/ASSEMBLY TESTING

The basic concept of component/assembly testing is to control the physical conditions in which the hardware item is tested. Tests are typically conducted in specialized environments, and data are collected regarding the performance of the hardware item in that environment. The scope of the tests may range from single microchip components up to major subassemblies. This section describes those special environments and the tests to be performed.

Dynamics Chambers

The object of these tests is to determine the ability of the test object to withstand various types of physical abuse which it may encounter in its operating environment. Dynamics test facilities consist of shake tables, shock tables, and stabilized platforms.

A shake table normally consists of a suspended platform which can be driven in three mutually perpendicular dimensions using magnetic drivers similar to those used in audio speakers. Power requirements are not significant, even in large-scale shake tables. Shock tables are similar to shake tables but the design parameters are significantly different. Since shock occurs in much shorter time periods than vibration (which is continuous), the same amount of energy will be used (or put into the shock table) in a very short time period. The average expenditure energy will be approximately the same for either shock or shake tables accommodating a given size test item. Such shock and vibration tables are common at contractor and government facilities requiring testing of equipment subject to vibrations in service.

A stabilized platform is a test table with three or six degrees of freedom up and down, back and forth, side to side, pitch, yaw, and roll. The center of gravity of a test object mounted to a table with three degrees of freedom can be moved along a predefined path. A six-degrees-of-freedom table extends this capability to angular motion about the test object's center of gravity. This

capability is valuable for assessing the ability of a test object to perform its functions (e.g., surveillance) from a dynamic platform. Power requirements are modest.

Nuclear Radiation Chambers

The object of a radiation chamber is to determine the detrimental effects of various types of radiation. Radiation testing (other than that involving nuclear explosions) can be accomplished by exposing materials to:

- o Radiation from a research or test nuclear reactor
- o A beta/gamma radioactive source, such as cobalt-60 or cesium-137, in an exposure chamber or pool
- o Nuclear particles in an accelerator (Van de Graff, cyclotron, etc.) in a target room (requires very large power source)
- o X rays from an x-ray machine (requires large power source).

The specific device used will depend on the type of radiation, energy, and intensity desired, the size of the object, and the availability of the facility.

Wind Tunnels

Some components will be tested to determine aerodynamic characteristics, including the efficiency of the shape to move through the air and the effectiveness of various control systems to provide stabilization and guidance at various altitudes (air density) and speeds. Tests are conducted by placing either a full-sized or reduced model of the test object in the tunnel and moving air past the object.

Air is moved through the tunnel by various means, depending on the velocity at which the tunnel is operated. Subsonic and transonic tunnels achieve their required velocities through the use of large fans. Hypersonic wind tunnels also use large fans, but when maximum tunnel pressure is reached large bottles of compressed air are rapidly discharged into the tunnel, causing a blocking plate to break and allowing air to move through the tunnel at many multiples of the speed of sound for a very short period of time.

Shock tunnels are essentially pressure chambers that can be evacuated. High pressure air can be instantaneously released into the chamber simulating high-speed, low-pressure air flow past a test object. This type of chamber is used to simulate conditions at high altitudes.

Data are collected by means of many small temperature and pressure sensors on and around the object, and by high-speed photography of the object while the test is in progress. Power requirements of these chamber varies from quite low (sub-scale models) to quite high (full-scale test objects).

Nuclear Testing

Underground nuclear explosion testing is performed by drilling a vertical shaft and establishing a detonation chamber at the bottom. Test objects are placed in horizontal tunnels leading away from the detonation chamber, and exposed to the high-intensity radiation pulse from the detonation. Usually one detonation serves many experiments and tests. Impacts on the physical environment include the commitment of an underground volume to radioactive contamination, the disposal of drilling spoils, and the fracturing of geological structures from the detonation. No fission products are emitted to the atmosphere.

FLIGHT TESTING

The government normally establishes flight ranges to test specific type systems from a dedicated facility. For the purpose of the Strategic Defense Initiative, flight testing can include missiles in ballistic flight trajectories or tests with objects in orbit.

Missile Range

Missile ranges consist of a launch area with launch pads and associated control and support facilities, a safety area around the launch area, and a controlled land/sea/air/space area for flight and impact. A missile range comprises large areas of the earth's surface and include tracking, communications and recovery facilities.

FINDING OF NO SIGNIFICANT IMPACT

STRATEGIC DEFENSE INITIATIVE ORGANIZATION
U.S. DEPARTMENT OF DEFENSE

AGENCY: Department of Defense

ACTION: Decision to conduct Demonstration/Validation tests of the Exoatmospheric Reentry Vehicle Interception System (ERIS).

BACKGROUND: Pursuant to Council on Environmental Quality Regulations for implementing the procedural provisions of the National Environmental Policy Act of 40 CFR Parts 1500-1508, and Department of Defense (DoD) Directive on Environmental Effects in the United States of DoD Actions, the DoD has conducted an assessment of the potential environmental consequences of Demonstration/Validation testing of the Exoatmospheric Reentry Vehicle Interception System developed by the Strategic Defense Initiative Organization.

SUMMARY: Demonstration/Validation would involve four types of tests: analyses, simulations, component/assembly tests, and flight tests. The locations of test activities for the Exoatmospheric Reentry Vehicle Interception System are:

FACILITY	TEST TYPE
California	
Vandenberg Air Force Base/ Western Test Range	Flight Tests
Colorado	
National Test Facility, Falcon Air Force Station	Analyses, Simulations
Hawaii	
U.S. Naval Pacific Missile Range, Barking Sands, Kauai	Flight Tests

Maryland

Harry Diamond Laboratories	Component/Assembly Tests

Nevada

Nevada Test Site	Component/Assembly Tests

Republic of the Marshall Islands

U.S. Army Kwajalein Atoll	Flight Tests

Tennessee

Arnold Engineering Development Center	Component/Assembly Tests

Virginia

Harry Diamond Laboratories	Component/Assembly Tests

To determine the potential for significant environmental impacts of the Demonstration/Validation of the Exoatmospheric Reentry Vehicle Interception System, the magnitude and frequency of the tests that would be conducted at proposed test locations were compared to the current activities at those locations.

To assess impacts, the activity was evaluated in the context of the environmental considerations for air, water, biological resources, infrastructure, hazardous waste, land use, visual resources, cultural resources, noise, and socioeconomics. As a result of that evaluation, consequences were assigned to one of three categories: insignificant, mitigable, or potentially significant.

Environmental consequences were determined to be insignificant if no serious concerns existed regarding potential impacts of the potentially affected area. Consequences were deemed mitigable if concerns existed but it was determined that all of those concerns could be readily mitigated through standard procedures or by measures recommended in existing environmental documentation. If serious concerns were identified that could not be readily mitigated, the activity was determined to represent potentially significant consequences.

FINDING: No significant impacts would result from analyses, simulations and component/assembly testing of the Exoatmospheric Reentry Vehicle Interception System. A potential for significant impacts resulting from flight testing was found at U.S. Army Kwajalein Atoll in the Marshall Islands. In recognition of the need to avoid, minimize, and mitigate any potential adverse impacts on the environment of the Kwajalein Atoll, the U.S. Army will prepare a comprehensive environmental impact statement addressing the continuing operations at the U.S. Army Kwajalein Atoll, which include the proposed Demonstration/Validation activities. The environmental impact statement will address the environmental concerns recognized in this Environmental Assessment and will identify appropriate mitigations.

FURTHER INFORMATION: A copy of

Exoatmospheric Reentry Vehicle Interception System,
Demonstration/Validation Program,
Environmental Assessment,
July 1987

is available from

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Dated 31 July 1987

James L. Graham, Jr.
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Director, Systems Engineering

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